

Communication and Coordination between Airway Facilities Sites: Implications for Operations Control Centers

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16. Abstract This report examined the communications and coordination patterns between Airway Facilities centers, specifically between the Operations Control Centers (OCCs), General National Air Space Maintenance Control Centers, and Air Route Traffic Control Center Maintenance Control Centers. Data were collected from a representative sample of facilities, broken out by region, via the Communication and Coordination Questionnaire. This questionnaire enabled Human Factors Engineers to provide a baseline for the frequency of communications, the modes of communications used for coordinating management and maintenance events between these facilities, as well as a measure of task cohesiveness within and between facilities. The findings showed that: the most frequently used communication modality for a number of events were telephone communications. Task cohesion between facilities was above average, but task cohesion declines as the distance from a facility to its regional OCC increases. The results provide direct suggestions for the transition team responsible for the new OCC conversion regarding the standardization of the OCCs.					
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Executive Summary

The Federal Aviation Administration (FAA) Airway Facilities (AF) service has designed and developed an operations concept, which results in a new way of conducting business. Their focus is on improving customer satisfaction in managing the National Airspace System (NAS) infrastructure services.

The new AF concept has consolidated management and maintenance functions into fewer, more centralized facilities, combined with an increase in remotely monitored, unmanned facilities. Three centrally located, regional Operations Control Centers (OCCs) are responsible for monitoring and maintaining the facilities in their region, assigning personnel and resources, and coordinating AF and Air Traffic information.

Human Factors Engineers (HFEs) from the NAS Human Factors Group (ACB-220) conducted this study to provide a baseline for the frequency of communications between the OCCs, General National Air Space (GNAS) Maintenance Control Centers (GMCCs) and Air Route Traffic Control Center Maintenance Control Centers (AMCCs) during this transition to the centralized OCC concept. Within the OCC concept, AMCCs and some large GMCCs were to become Service Operations Centers (SOCs) as scheduled. Responses from "SOCs" in our sample were exclusively from former AMCCs. For purposes of this report, we discuss them as AMCCs instead of SOCs to minimize confusion per the request of the program sponsor, Ms. Beverly Clark, NIM Program Staff (AOP-30). The study measured the modes of communications used for coordinating management and maintenance events between these AF sites, as well as measures of task cohesiveness within and between these AF sites. In preparation, the HFEs researched documents on current AF operations and literature regarding communications, coordination, and cohesion in order to develop a survey entitled the Communication and Coordination Questionnaire. Researchers surveyed a representative sample of presently assigned NAS Operations Managers and AF Specialists and consulted with Subject Matter Experts.

Across all facility types, the AF Specialists who responded to the Communication and Coordination Questionnaire ranked the following events for which the communication medium of telephone was used: 1) scheduled outages, 2) unscheduled outages, 3) facility status updates, 4) flight inspections, and 5) weather conditions. Combined, cc:Mail (e-mail), the Internet, faxes (facsimiles), face-to-face meetings (at collocated facilities), video conferencing, and teleconferencing accounted for less than 3% of all communications made between facilities. Further, the AF Specialists who responded suggested that there is a high level of accuracy and timeliness between facilities with regard to the information that they share.

Researchers collected task cohesion information for each facility and facility type (OCC, GMCC, and AMCC) and an average for all facilities. Described in a number of ways, task cohesion involves how group members feel about the group's goals, objectives, and productivity. Task cohesion can be used to assess teamwork efficiency. There was good task cohesion evident across and between facilities. It was determined that there were no significant differences in task cohesion levels with regard to the size of the facilities included in this survey. However, a significant negative correlation between task cohesion and the distance from a facility to its

regional OCC was observed. We recommend the improvement of task cohesion through training efforts and perhaps by making the Help Desk position (as outlined in the OPINE) a more permanent position. This would increase the rapport and domain-specific knowledge with farther facilities.

Finally, we recommend that after an established point in time, researchers provide a follow-up study that investigates these same issues, specifically for the fully operational OCCs.

1. Introduction

Airway Facilities (AF) personnel are responsible for maintaining all of the equipment in the National Airspace System (NAS). In order to accomplish this more effectively, the AF service adopted a model of centralized coordination of resources. This consolidated much of the coordination for maintenance in three Operations Control Centers (OCCs). In 2000, an AF and Professional Airways Systems Specialists (PASS) work group developed a transition plan that included establishing an initial date for the consolidation of OCCs, a timeline for standardization of the General NAS (GNAS) Maintenance Control Centers (GMCCs), and a timeline for OCC full capacity by June 2003 (Federal Aviation Administration [FAA] & PASS, 2001). In the transition plan, the new OCCs would assume many GMCC functions across the NAS, creating an AF organizational structure that does not include GMCCs. This resulted in the closure of a number of GMCCs.

Each of the remaining GMCCs was uniquely set up and, as a result, communication and coordination at each GMCC was not uniform. That is, there was no standardization among the GMCCs. The scheduled OCCs are assuming GMCC functions and overall responsibility for NAS infrastructure service management, with the completion of the transition. The newly designed OCCs were to have similar layouts and new standardized communication and coordination procedures.

This transition also affected the AMCCs, which were another component of NAS. All AMCCs and some GMCCs were renamed SOCs and their duties changed as well. Operationally and organizationally, the SOCs report to a System Management Office (SMO), which is an organizational entity that has one or more SOCs under its jurisdiction. They perform functions similar to an OCC, but their focus is on the specific NAS infrastructure services and systems supporting the assigned high NAS impact Air Route Traffic Control Center (ARTCC), Terminal Radar Approach Control (TRACON), or Air Traffic Control Tower (ATCT/TRACON) domains. Within the OCC concept, AMCCs and some large GMCCs were to become Service Operations Centers (SOCs) as scheduled. Responses from "SOCs" in our sample were exclusively from former AMCCs. For purposes of this report, we discuss them as AMCCs instead of SOCs to minimize confusion per the request of the program sponsor, Ms. Beverly Clark, NIM Program Staff (AOP-30).

The OCCs communicate and coordinate operations and maintenance activities within their respective OCC domain. Among other responsibilities, the OCCs communicate and coordinate between each other when an event response involves another OCC (FAA, 1999). The roles and tasks of the AF Specialists have changed. Their duties are more clearly assigned, and the geographic area of responsibilities has increased. As a result, effective communication and coordination processes are critical for successfully maintaining the new organization.

This study is one in a series investigating communication and coordination processes in AF (Ahlstrom, Koros, & Heiney, 2000; Hah, 2002). It was to provide a baseline measure of communication and coordination patterns between AF Specialists during the transition to the

OCC concept of operations. Based on best practices from the literature, this report provides direct recommendations for how to make the communication and coordination processes between the OCCs more successful.

1.1 Background

Based on the literature, we investigated two components of communication and coordination: 1) the role of AF communication and coordination in the current AF environments and, 2) the impact that task cohesion has on the AF Specialists' communications and coordination efforts. To reiterate, the literature describes task cohesion in many ways. For example, task cohesion is a measure of willingness and commitment to completing a task. It is associated with successful communication and organizational outcomes. Much of the communication literature is focused on the factors that affect communications within a team. If AF is considered more holistically as a team, then the individual facilities qualify as groups within the AF team.

Researchers assessed how AF Specialists communicate and coordinate among facilities and investigated group task cohesiveness as it relates to successful communication and coordination. Further, we were interested in determining the impact that group changes had on the communication and coordination of management and maintenance events between AF Specialists and their respective facilities. Specifically, we were interested in how the AF organizational changes have affected the communication and coordination efforts regarding boundary or overlapping coverage issues at the OCCs.

1.1.1 Communication and Coordination

For effective coordination of management and maintenance events to occur, AF specialists need to communicate among one another. However, the exchange of information through communication may not always be an automatic process. Things can and do go wrong during the exchange. According to Mohan (1998), 90% of what goes wrong with projects comes down to poor communications. When a situation deteriorates, poor communication is almost always the reason.

Communication and coordination are needed for efficient organizational functioning. Lewis (2000) explains that communication during an organizational transition is complex. The complexity lies in the high degree of communication and coordination needed to accomplish change. There have been several efforts that detail various organizational processes within AF (Ahlstrom et al., 2000; CTA, Inc., 1993; FAA, 1997; FAA, 1999; McMannis Associates, Inc., 1994; Systems Flow, Inc., 1994; Truitt & Ahlstrom, 2000). Although not the main focus of these investigations, each does mention the importance of communication and coordination processes within AF. That is, very little is known about the current AF communication and coordination practices.

In general, there are only a few situations in which one GMCC needs to communicate and coordinate with another GMCC (K. Grayson, personal communication, June 6, 2001). One situation deals with boundary issues. There are times when GMCCs' area of coverage overlap, especially when weather conditions or capacity issues affect the maintenance delivery to the

boundary facility or site. According to Grayson, the OCCs will likely have more boundary issues and therefore, more communication and coordination between the OCCs will be occurring.

1.1.2 Cohesiveness

Cohesion is a factor that may enhance communication and coordination. One definition of group cohesion is the degree to which an individual believes that the members of his or her work group are willing to work together and are committed to the completion of the tasks and goals of the work group (Riordan & Weatherly, 1999). Cohesiveness is an important and defining characteristic of a work group (Hackman, 1992) and is correctly conceptualized as a group-level factor (Wech, Mossholder, Steel, & Bennett, 1998). That is, by determining the cohesion levels of the individual members of a group, one can aggregate those scores to establish a group-level score for cohesion (Gully, Devine, & Whitney, 1995). Cohesion is important because it may indicate the levels at which groups are cooperating, communicating, and coordinating together.

According to Carron, Widmeyer, and Brawley (1985), there are two dimensions to cohesion: task cohesion and social cohesion. Task cohesion involves how group members feel about the group's goals, objectives, and productivity. Social cohesion involves how group members feel about the group's social interactions. This distinction is valuable because it can add clarity as to the conditions under which the two types of cohesion may predict particular effects (Zaccaro, 1990). However, Carless (2000) suggests that task cohesion is the critical dimension associated with group performance. Cohesion can be measured on two levels-individually or as a group (Carless, 2000; Carron & Brawley, 2000). Carless suggests that, in work groups, cohesion is most appropriately measured as a group-level variable.

Task cohesion and social cohesion have been measured with the Group Environment Questionnaire (GEQ: Carron et al., 1985) by many researchers in many domains. Because the GEQ is a group-oriented questionnaire, it may be a good way to measure work-group task cohesion when evaluating AF domains. If too little cohesion exists in a group, then there will be miscommunications. On the other hand, if there is too much cohesion, especially social cohesion, then there may be too much socializing and performance may suffer. Further, because it is believed that communication and cohesion may be closely related, changes in cohesion may also be associated with changes in communication and coordination effectiveness.

With the transition from the GMCCs to the OCCs comes a change in the size and uniqueness of the groups involved. Therefore, it is important to determine which cohesion factors may play a role in this transition. Some of these factors follow:

- Size of the Group. In general, as the size of a group increases, the level of cohesiveness decreases (Fleishman & Zaccaro, 1992). For example, a group with three members should be much more cohesive than a group with 100 members. The 'size of the group' is important with this transition because the OCCs have many more group members than the existing GMCCs.

- Work-Group Norms. Langfred (1998) found that if the work-group norms were task-oriented (i.e., goal-oriented), then highly cohesive groups would outperform others. However, if the work-group norms were social-oriented (i.e., interpersonal bonding), then the high cohesiveness of a group may be detrimental to performance. Group cohesion can be considered in both its social cohesive and task cohesive contexts.
- Purpose of a Study. A study by Mullen and Copper (1994) evaluated whether the group was designed for the purpose of the study (i.e., participants) or whether the group was “real” (i.e., permanent employees). Cohesion was significantly stronger in “real” groups.
- Commitment to Task. Mullen and Copper (1994) advise that performance may be enhanced if one can boost group members’ liking for their group tasks. Likewise, Podsakoff, MacKenzie, and Ahearne (1997) imply that members that accept the goals of the group will perform better than those members who do not. The transition to the OCCs has brought about new roles and responsibilities for the group members. Group members must be committed to and accept the goals of their new tasks.
- Work Group Identification. This factor can be defined as a personal bond between group members and their group’s ideals or “norms.” In addition, work group identification does not require the need for social interaction. Like Carless (2000), Riordan and Weatherly’s (1999) study suggests that group cohesion is better assessed as a task factor (i.e., as task cohesion) rather than as a social factor (i.e., as social cohesion). Further, the benefits to having a high level of work group identification include a greater commitment to the work group, more cohesion, self-sacrifice, and positive evaluations of the group.
- Resource Allocation and Preplanning. Aquino and Reed II (1998) suggest that cooperation between groups is affected by whether the groups have had an opportunity to “preplan” (i.e., communicate/cooperate with each other) before making a resource allocation decision. In another study, it was found that when group members use the opportunity for preplanned discussion to coordinate their strategies and work as a group, their performance is enhanced (Bornstein, Rapoport, Kerpel, & Katz, 1989).

1.1.3 Other Implications

Another factor that affects communication and coordination processes is information processing. Information processing deals with the amount of incoming information an organization or individual can efficiently handle. O’Reilly III (1980) suggests that communication is selectively filtered by those who manage its flow. It may be that individuals do not accurately perceive their information processing limits. Rather, they seek more information than can optimally be processed. This increased information load may make it difficult for the accurate identification of relevant information and may result in decreased organizational performance. This has implications for existing GMCCs because the way that incoming calls are processed may affect the group’s performance and coordination efforts. The GMCC approach was to have anyone

available to answer the incoming call. However, the new OCCs have outlined in their OPINEs that a specified person(s) at the Help Desk position is responsible for taking incoming calls. Therefore, the manner in which information flows into the OCCs is an issue.

Certain barriers to communication and coordination may also moderate organizational efficiency. It is critical to eliminate any form of communication barrier (Irmsher, 1996). Two communication barriers that may affect performance are employees' personal background and training. Group members that have similar backgrounds reinforce the members' identities and also contribute to cooperation (Jarvenpaa & Leidner, 1998).

Further, a clear definition of responsibilities will improve communication and coordination. Schlichter, Koch, and Burger (1997) suggest that an established and trusted relationship requires less coordination efforts, because there is a mutual understanding between the involved members.

Another possible communication and coordination barrier deals with the type of media (i.e., communication medium) used for communication including electronic mail (e-mail), telephone, voice-mail, chat rooms on the Internet, Faxes, and Face-To-Face (FTF) interactions. Of these, the telephone and Computer-Mediated Communications (CMCs) are examples of communication mediums used in the GMCCs. For example, Ahlstrom et al. (2000) estimate that GMCC specialists spend as much as 50% of their time on the telephone performing coordination tasks. They also state that one of the OCC transition goals is to reduce telephone use to 20 to 30%. In an evaluation of the use of computers for group work, McGrath and Berdahl (1998) state that when using CMCs rather than FTF communications, CMC groups have to work harder to complete tasks, and their group members had a lower positive affect toward each other. Yet, over time, these harmful effects were shown to fade.

With the transition to the OCCs came the reality of new groups forming. The transition team hopefully has considered the most effective ways to incorporate these new group members in an effort to reduce or eliminate any barriers to communication and coordination that may be developing.

1.2 Purpose

Human Factors Engineers (HFEs) from the William J. Hughes Technical Center NAS Human Factors Group (ACB-220) conducted an 'in-transition' baseline study that examined and assessed the current (i.e., before completely transitioning to the OCCs) communication and coordination processes of AF. Additionally, this investigation measured differences of group task cohesion due to variations in the size of AF work groups and differences due to the distance from a facility to its regional OCC. By examining the role of current AF communication and coordination processes, especially the task cohesion factor, HFEs have provided a 'in-transition' baseline of communication and coordination between AF facilities and have offered recommendations on how to further support the continued evolution of the OCC concept.

2. Method

Based on the literature review and discussions with AF Subject Matter Experts (SMEs), the HFEs designed the Communication and Coordination Questionnaire (Appendix A). The questionnaire addressed AF NAS Operations Managers (NOMs) and Specialists' preferences for communication medium(s), the sharing of resources, and workload. The questionnaire also addressed their perception of between and within facility task cohesiveness. AF Specialists and NOMs working at GMCCs, OCCs, and AMCCs (the questionnaire itself uses the term "SOCs" rather than "AMCCs") received the questionnaire. To assure the quality and usability of the Communication and Coordination Questionnaire results, Dillman's (2000) procedures indicate that at least a 30% return rate would be ideal. Thus, we sent out 412 questionnaires (one site asked for 22) to conservatively satisfy these guidelines. In the end, 44 unused questionnaires were returned by facility Points of Contact (POCs), yielding an actual total of 368 questionnaires delivered to AF Specialists. According to Dillman, approximate sample size of 86 for a population of 600 provided power (using a plus/minus 7% sampling error, a 95% confidence level with an 80/20 possible split, derives this sample size). Each GMCC and AMCC facility has about 20 specialists (including NOMs), and the OCCs have about 50 specialists (including NOMs). Therefore, we sent out 20 questionnaires to each of the 16 randomly chosen GMCC/AMCC sites and 30 questionnaires to each of the three OCCs. However, the final sites selected depended on coordination with PASS and the sector and facility management. The sites included were: Eastern Region GMCC (AEA), Boston GMCC (ANE), Jacksonville AMCC (ZJX), Atlanta AMCC (ZTL), Chicago AMCC (ZAU), Minneapolis AMCC (ZMP), Dallas/Fort Worth AMCC (ZFW), Gulf Coast MCC (HOU), Denver AMCC (ZDV), Denver GMCC (DEN), Salt Lake City GMCC (SLC), Oakland AMCC (ZOA), Elgin GMCC (ELG), Los Angeles AMCC (ZLA), Salt Lake City AMCC (ZLC), Alaska GMCC (AL2), Atlantic Operations Control Center (AOCC), Midstates Operations Control Center (MOCC), and Pacific Operations Control Center (POCC).

2.1 Participants

The participants in this study were the 368 AF Specialists and NOMs from the GMCCs, OCCs, and AMCCs that received the Communication and Coordination Questionnaire. Out of the 368 participants, 99 AF Specialists/NOMs responded. Thus, the response rate was 27%. In an effort to maintain confidentiality, no data were collected regarding the respondent's age. However, 98% of the 2000 Employee Attitude Survey respondents for the AF population fell between the ages of 26 and 65 (FAA & OMNI Corporation, 2001). Possible reasons for the poor response rate are discussed later in this document. We did not involve mental or physical risks or adverse effects in this investigation. The consent form stated that the only direct benefit to them was the satisfaction of knowing that they contributed to the understanding about how AF Specialists communicate and coordinate within and outside of the AF environment. The consent form also stated that participation was voluntary and that participants may withdraw at any time without penalty or loss of benefits to which they are otherwise entitled. If participants had questions about this study or needed to report any injury or adverse effects from the research procedures, the consent form provided contact information and instructed participants to contact the principal

investigator. Data from participants were anonymous and confidential. Appendix B contains the consent form that participants signed, removed from the rest of the questionnaire, and turned in to their facilities' POC.

2.2 Materials

HFEs designed the Communication and Coordination Questionnaire to collect baseline information on the communication and coordination processes between AF and to collect group task cohesion levels. After reviewing the literature and some of the important factors that affect communication and coordination, HFEs interviewed SMEs as to when facilities communicate and coordinate with each other. HFEs modified all of the items used in the Communication and Coordination Questionnaire to address the terminology of the AF context. A pre-test of the modified GEQ cohesion items determined that only the task cohesion items of the Communication and Coordination Questionnaire were applicable in the AF context (K. Grayson, personal communication, June 14, 2001) and, therefore, we dropped all of the social cohesion items. Further pre-testing determined that the Communication and Coordination Questionnaire would take approximately 15 minutes to complete (D. Vickers, personal communication, August 1, 2001).

2.2.1 Communication and Coordination Questionnaire

The Communication and Coordination Questionnaire contains three parts: general information questions, communication medium questions, and perceptions of current communication and coordination processes, including group task cohesion items.

- General Information (Items # 1 - 8a). This section collected the following information: the type of facility the specialist represents now and their history with other facility types; the specialists' certifications, their job title, and their duration of employment; estimates of the past week's workload; their use of Standard Operating Procedures or Operating Procedures in the NAS Environment (SOP/OPINE); and whether they thought the SOPs/OPINEs are good resources for making job-related decisions.
- Part A: Communication Mediums (Items # 1 - 13). This section collected the following information regarding the communication mediums used on the job: number of telephone and e-mails made and received in the past week; the percentage of the different communication mediums used when communicating with other facilities; the personnel at facilities with whom they most often communicate; and the type of maintenance events that are communicated.
- Part B: Communication and Coordination Processes. Items 2 - 11, 23, 24 and 26 of this section were adaptations of the GEQ task cohesion items (Carron et al., 1985). The participants answered the group task cohesion items as they pertained to their perceived level of task cohesion between their facility and other GMCCs, OCCs, and AMCCs.

Other items measured the specialists' preferences for coordinating with another facility via telephone or by e-mail. Additionally, there were items that asked the specialists their opinion about the sharing of resources between facilities.

2.3 Procedures

In March 2001, an HFE visited the Leesburg GMCC to observe AF communication and coordination processes in the field. Based upon information from this visit, HFEs determined that a communication and coordination questionnaire would be the best way to capture the baseline information. Appendix C provides a discussion (Bailey, 1994) pertaining to the advantages and disadvantages of conducting a self-administered questionnaire versus the interview technique. For example, some advantages of the self-administered questionnaire are that questionnaires save time and money, they are more anonymous, and they are more standardized. These considerations also drove our justification for using the self-administered questionnaire.

HFEs coordinated the distribution of the questionnaires and briefed the project's goals to PASS national and management from the sites that we selected to receive the questionnaire, prior to mailing. At each site, we identified a POC who received a package of 20 to 30 Communication and Coordination Questionnaires to distribute to volunteer participants. In most cases, the POC was the site's Facility Manager. If a certain facility needed more Communication and Coordination Questionnaires, the POC contacted the principle investigator and we mailed more Communication and Coordination Questionnaires to them. There were two facilities that requested more questionnaires. We enclosed self-addressed and stamped envelopes so that participants could return the questionnaire directly to us. One week after mailing the packets, we telephoned the POCs to make sure that the packets arrived and also provided a reminder to distribute the questionnaires to volunteers. Three weeks after mailing out the questionnaires, we sent a reminder postcard to each of the POCs to assure that the volunteers were completing the questionnaires and returning them to us. We made a final follow-up call after 1 month to the POCs to thank them for their assistance and, depending on the response rate, to provide a final reminder that any outstanding questionnaires need to be returned.

As mentioned previously, we mailed 412 Communication and Coordination Questionnaires (44 unused questionnaires were subsequently returned, therefore, 368 is the final sample size) to the 19 regionally sampled facilities: the three OCCs, seven GMCCs, and nine AMCCs. It should be noted that we originally mailed the questionnaire to 15 facilities on November 5, 2001. Shortly thereafter, the local postal distribution facility, which routes the mail out of our region, was shut down due to Anthrax exposure. This event delayed the mailing of the questionnaires. As a consequence, the questionnaires were delivered during the holiday period, which may have contributed to the poor response rate. Further, we called each facility and found that a few isolated problems (i.e., PASS coordination concerns, too busy) may also have contributed to the poor response rate. Due to the lower than expected response rate, we included, after PASS and management approvals, four more facilities, which increased the response rate from approximately 20% to the observed 27%.

Approximately every 2 years, the FAA conducts the Employee Attitude Survey (EAS: D. Broach, personal communication, April 22, 2002). This survey assesses employee beliefs and perceptions regarding coworkers, supervisors, managers, and the FAA that affect the quality of the employees work life. This valuable information allows the Air Traffic Services management team to track the impact of programs and policies that affect NAS. It also provides data that can be useful when enlisting external support for new and existing programs so that the FAA's work is more effective, efficient, and performed with increased satisfaction and pride. Like the Communication and Coordination Questionnaire, the EAS reports group statistics. The lowest level of reporting is aggregated at facility-level results for those facilities with sufficient responses. For these reasons, where applicable, we have provided comparisons between the EAS overall AF results (FAA & OMNI Corporation, 2001) and the Communication and Coordination Questionnaire findings.

2.4 Results

2.4.1 Analyses of the General Information Items

The Communication and Coordination Questionnaire gathered baseline information on the duration of the respondents' time as an AF employee, as well as their duration employed at any of the GMCCs, OCCs, or AMCCs. Overall, respondents have worked, on average, in an AF capacity for more than 19 years. This finding suggests that these respondents are members of a very experienced workforce. To compare to the 2000 EAS, the majority of our respondents fell within the 16 through 20 years category in which only 10% of the 6,059 AF employees who responded to Item #127 of the 2000 Employee Attitude Survey were classified (FAA & Omni Corporation, 2001). Further, AF tenure increased from the OCCs, AMCCs, and GMCCs, respectively. This has implications for the future of the OCCs in that the OCC Specialists have more of their careers ahead of them. As shown in Figure 1, AF experience increased from the OCCs (mean = 16.1 years, sd = 8.0 years), the AMCCs (mean = 18.7, sd = 9.0 years), and the GMCCs (mean = 22.7, sd = 7.2 years), respectively.

The respondents of the Communication and Coordination Questionnaire also indicated their areas of expertise. AF Specialists are certified in multiple areas of specialization. Of the 99 respondents, there were a combined total of 39 Navigational Aids, 25 Environmental, 46 Automation, 62 Communication, 30 RADAR, and 28 Weather-certified Specialists.

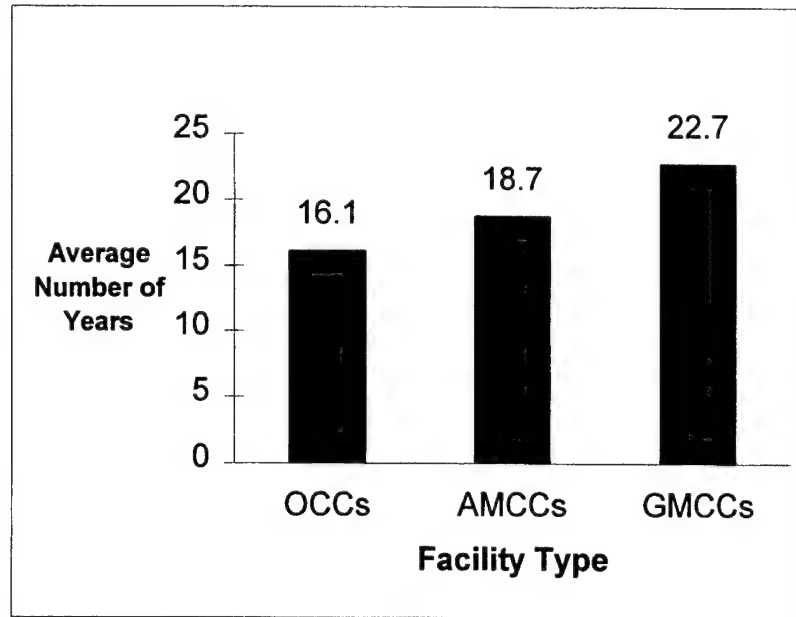


Figure 1. Average number of years of AF employment.

Overall, respondents indicated that they used their SOPs/OPINEs about 41% of the time to make job-related decisions, and 49% thought that their SOP/OPINE was a good resource for making job related decisions. However, SOP/OPINE use varied by facility type. The OCCs use their OPINE over 59% of the time, whereas, the GMCC and the AMCC use their SOP less, approximately 41% and 37 %, respectively (see Figure 2). This finding is associated with tenure in that the more experienced specialists use the SOP/OPINE less. The correlation between the more experienced GMCC Specialists and their SOP use was negative ($r = -.16$). However, the least experienced group for this sample also used the SOP/OPINE more frequently. The correlation between the less experienced OCC Specialists and their OPINE use was positive ($r = .13$). For more SOP/OPINE results, see the 'Additional Comments' section.

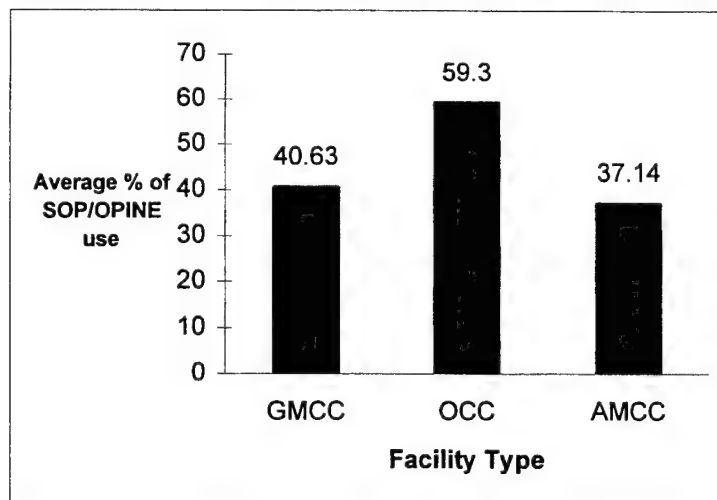


Figure 2. The percent of time SOPs/OPINEs used for job-related decisions.

2.4.2 Baseline Analyses of Weekly Calls, cc:Mails, and Workload

To assess the primary modes and patterns of coordination, we asked respondents, "When you coordinate with GMCC/OCC/AMCCs, what percentage of the time do you use: a) FTF, b) the telephone, c) cc:Mail, d) Internet, e) FAX, f) meetings (more than two people), g) video conferencing, or h) teleconferencing?" Overwhelmingly, the response was telephone use. Overall, the second most used medium of communication for AF coordination was done face-to-face. This may be due to the collocation of some facilities. However, in communications between GMCCs and OCCs, the second most used medium was teleconferencing (see Table 1).

Table 1. Percent of Most Used Communication Mediums by Facility Type

	% of phone used to coordinate with OCCs	% of phone used to coordinate with GMCCs	% of phone used to coordinate with AMCCs	% of next highest communication medium used to coordinate with OCCs	% of next highest communication medium used to coordinate with GMCCs	% of next highest communication medium used to coordinate with AMCCs
Overall AF	80.0	65.2	67.7	1.1 (FTF)	7.5 (FTF)	7.7 (FTF)
GMCC	68.7	64.3	53.4	2.2 (teleconferencing)	1.7 (cc:Mail)	7.6 (FTF)
OCC	79.4	84.6	87.8	5.5 (FTF)	1.0 (teleconferencing)	2.2 (cc:Mail)
AMCC	89.0	57.3	66.8	1.4 (FAX)	13.8 (FTF)	10.9 (FTF)

Respondents were also asked with whom they communicate at the various facilities. Figure 3 depicts that when coordinating with OCCs, GMCCs, and AMCCs, the respondents mostly speak with another specialist. Sometimes, they speak with a Field Technician.

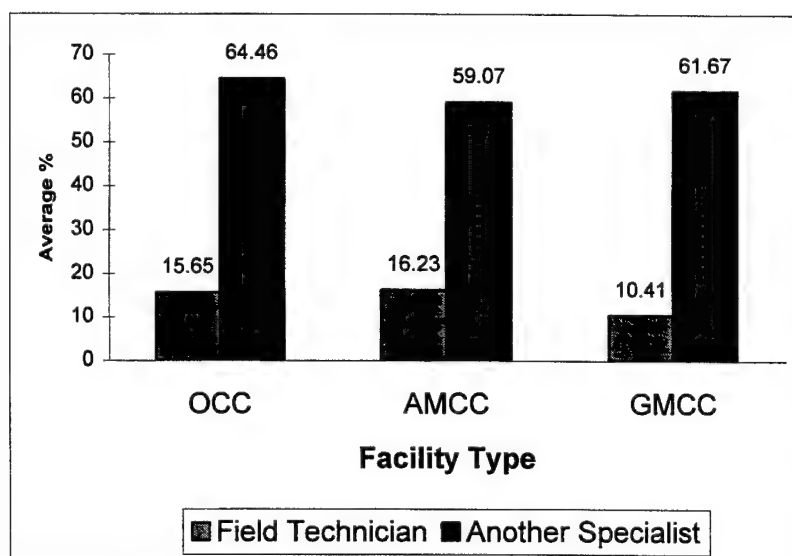


Figure 3. Coordination with personnel by facility type.

Table 2 outlines the pattern of telephone calls made to and received from the various facilities over “the past week.” Bolded values highlight that the telephone communication pattern for the GMCCs was primarily with other GMCCs. However, for telephone use, the OCCs and the AMCCs primarily communicate with the OCCs.

Table 2. Frequencies of Telephone Calls Among Facilities

	Calls to GMCCs	Calls to OCCs	Calls to AMCCs	Calls from GMCCs	Calls from OCCs	Calls from AMCCs
Overall AF	35	26	24	28	25	20
GMCC	76	7	13	62	7	12
OCC	29	69	59	18	56	47
AMCC	10	22	17	10	26	15

Table 3 outlines the number of cc:Mails (i.e., e-mails) made to and received from the various facilities over “the past week.” Bolded values highlight that the cc:Mail communication pattern for all facility types stays mostly within that facility type.

Table 3. Frequencies of cc:Mails Among Facilities

	cc:Mails to GMCCs	cc:Mails to OCCs	cc:Mails to AMCCs	cc:Mails from GMCCs	cc:Mails from OCCs	cc:Mails from AMCCs
Overall AF	2	2	3	5	6	6
GMCC	6	2	2	14	3	3
OCC	0	8	1	1	25	1
AMCC	1	0	4	1	0	11

HFes also asked AF Specialists about the events for which they communicate with other facilities via telephone. In rank order, it was found that specialists made telephone calls to facilities for the primary events of: 1) Scheduled Outages, 2) Unscheduled Outages, 3) Facility Status Updates, 4) Flight Inspections, and 5) Weather Conditions.

Regarding workload, we asked respondents whether or not they considered the past week's workload as average. We found that 62.5% of the respondents perceived their workload as "average." Of the 37.5% who thought that the past week's workload was not "average," 57.1% thought that the workload was greater than average.

2.4.3 Analysis of Cohesion Aggregation Procedure

The HFEs interpreted the cohesion responses as group-level scores that were made for each facility type based on the Communication and Coordination Questionnaire responses. Next, HFEs combined individual task cohesion scores for an overall, group-level score of task cohesion for each facility type. Moreover, we combined questionnaires to establish a group level measure of task cohesion for the OCCs, GMCCs, and AMCCs. Figure 4 references the aggregation and the associated average levels of task cohesion. We based values on a 6-point scale, with 6 representing the highest level of task cohesion. Also, note that one facility (ANE) had no data for the cohesion items. Subsequently, this facility was not included in the cohesion analyses.

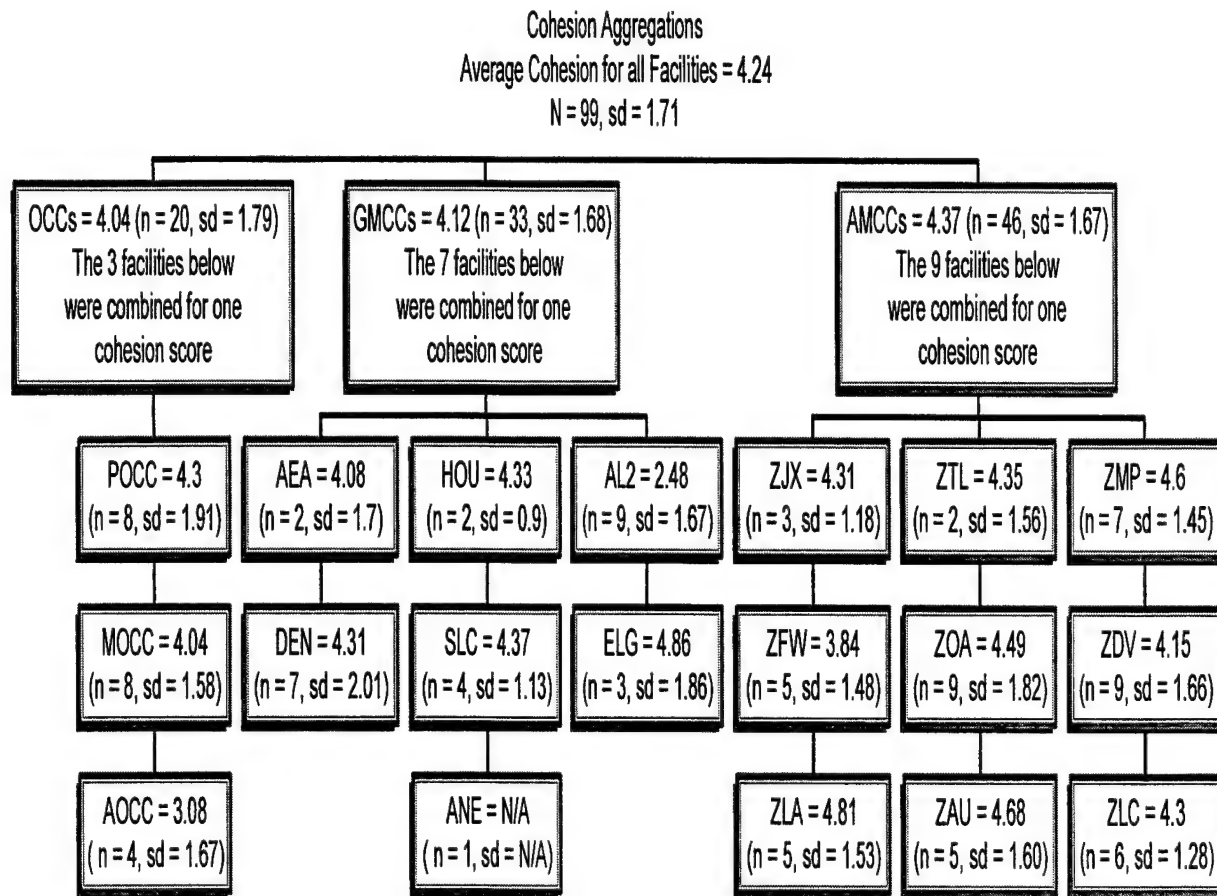


Figure 4. Average task cohesion scores by facility, facility type, and overall AF.

If individual-level data are summarized as group means without ensuring the homogeneity of responses at the individual level, then aggregation bias becomes a potentially severe problem (Gully et al., 1995). To correct for this bias, if one desires to discuss group levels, we need to use appropriate aggregation procedures for individual-level measurements (Rousseau, 1985). We followed these aggregation procedures and detected no aggregation bias, $F(2,15) = 0.98$, $p > .05$. A nonsignificant finding indicates that there were no differences between the groups, and, therefore, aggregation is applicable.

2.4.4 Analyses of Task Cohesion Items

For the task cohesion data, we performed analyses between task cohesion and group size and determined if the data were correlated with distance from a facility to its regional OCC. For the group size-task cohesion analyses, three independent Analyses of Variance (ANOVAs) were employed to test the differences between the three types of facilities. The differences between all three facilities' average levels of task cohesion were nonsignificant (p 's $> .05$). This finding suggests that the size of the facility did not impact the average levels of task cohesion obtained. However, there was a significant negative correlation between a facility's average level of cohesion and the distance from that facility to its regional OCC, $r = -0.83$, $p < .05$. This finding suggests that the farther away a facility is from its regional OCC, the lower the average level of task cohesion (see Figure 5). Further, if AL2 (Alaska, an outlier) is excluded from this analysis, the results are still significant, $r = -0.35$, $p < .05$.

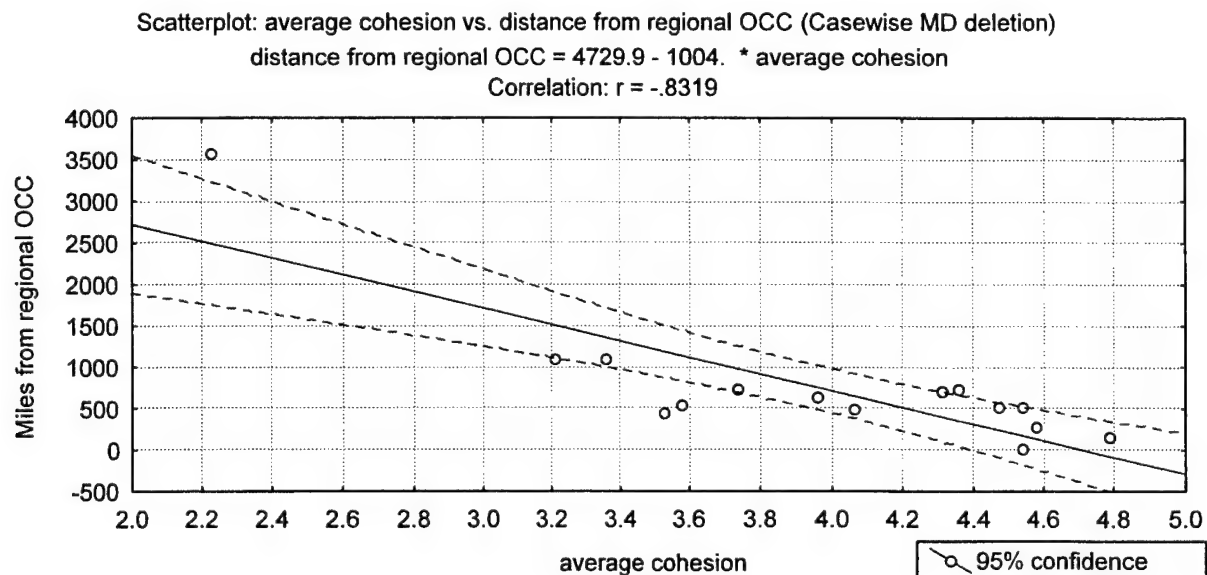


Figure 5. Average task cohesion by site distance (from regional OCC) correlation.

2.4.5 Analyses of Procedural Items

This part of the results section addresses those items that were not included in the cohesion analyses (Part B, Items 1, 12 – 22, and 25). These items are of a more procedural nature. Also, due to the nature of these items, we scored them dichotomously. For these items, responses of 1,

2, or 3 were scored as a “disagree” response, and responses of 4, 5, or 6 were scored as an “agree” response. We also collected information about the implications of sharing personnel, equipment, and spare parts with other facilities. Further, this section provides the communication preferences of specialists when coordinating events (see Appendix D for a table for these items’ percentages).

The analyses of the procedural items indicated that:

- a. Overall, AF Specialists agreed that there are clearly defined procedures in place when communicating and coordinating with the AMCCs (67% agreement) and the GMCCs (72% agreement).
- b. Overall, AF Specialists disagreed that there are clearly defined procedures in place when communicating and coordinating with the OCCs--for the AMCCs (46% agreement) and the GMCCs (41% agreement).
- c. Overall, a high percentage of specialists agreed that coordination between facilities is adequate (GMCCs = 89% agreement, OCCs = 69% agreement, and AMCCs = 92% agreement).
- d. Overall, response times were adequate as well (GMCCs = 85% agreement, OCCs = 65% agreement, and AMCCs = 86% agreement).
- e. Overall, AF Specialists agreed that information exchanged between facilities is accurate (GMCCs = 80% agreement, OCCs = 62% agreement, and AMCCs = 88% agreement).
- f. Overall, AF Specialists agreed that information exchanged between facilities is timely (GMCCs = 83% agreement, OCCs = 62% agreement, and AMCCs = 89% agreement).
- g. Overall, AF Specialists also agree that they spend a great deal of time coordinating with other facilities (GMCCs = 73% agreement, OCCs = 62% agreement, and AMCCs = 78% agreement).
- h. Overall, AF Specialists agree that they have received the necessary training to communicate between facilities (GMCCs = 80% agreement, OCCs = 76% agreement, and AMCCs = 79% agreement).

Regarding the boundary sharing issues, specialists agree that they use the telephone to coordinate these issues in a timely manner (GMCCs = 93% agreement, OCCs = 77% agreement, and, AMCCs = 92% agreement). However, cc:Mail was not found to be a timely manner for coordinating a boundary sharing issue (GMCCs = 18% agreement, OCCs = 19% agreement, and AMCCs = 17% agreement). Specialists would much rather communicate by telephone than by cc:Mail when coordinating between facilities (for telephone: GMCCs = 95% agreement, OCCs = 94% agreement, and AMCCs = 99% agreement; and for cc:Mail: GMCCs = 8% agreement; OCCs = 10% agreement; and, AMCCs = 10% agreement). Further, specialists would prefer to communicate through the Intranet (i.e., Event Ticket) rather than by cc:Mail (for Intranet: GMCCs = 22% agreement, OCCs = 25% agreement, and AMCCs = 25% agreement).

Both the Communication and Coordination Questionnaire and the 2000 EAS (FAA & Omni Corporation, 2001) asks AF Specialists about whether or not they have the necessary tools to do

their jobs. Item #24 of Part B of the Communication and Coordination Questionnaire matches up with Item #109 of the 2000 EAS. On average, a high percentage of specialists agreed that they have the “necessary tools (i.e., telephone, computer, software)” to communicate with other facilities (GMCCs = 79% agreement, OCCs = 77% agreement, and AMCCs = 80% agreement). The 2000 EAS showed that 53% of the 6,314 AF respondents agreed that they had the “tools needed to do [their] job efficiently (computers, test equipment, communication devices, etc.)” from a considerable to great extent. Another EAS 2000 item (FAA & Omni Corporation) matches well here. Item #99 asks, “To what extent have you received the training you need to perform effectively in your job?” Of the 6,290 AF respondents, 45% thought they received adequate training from a considerable to great extent. Appendix E presents a complete table of the remaining means and standard deviations for all Communication and Coordination Questionnaire items.

2.5 Additional Comments

The Communication and Coordination Questionnaire had two sections for specialists to provide comments. The first opportunity for specialists’ input was in response to, “Do you think that the SOP for your position is a good resource for making job-related decisions? Why or why not?” There were 69 responses that fell into three categories: 1) Standardization Issues, 2) Training Issues, and 3) Unusual Events. Approximately 43% of responses addressed standardization issues; approximately 28% of responses addressed training issues; and, approximately 43% of responses addressed unusual events. The commentary provided by the specialists suggests that SOPs/OPINEs are good resources for applicable situations. Appendix F lists the comments made by specialists regarding SOP use.

The end of the questionnaire provided the second opportunity for specialists’ written input, “Based on your responses above, please provide any comments that you wish to add to justify your responses.” There were 44 responses that fell into three categories: 1) OCC Transition Issues, 2) Procedural Issues, and 3) Training Issues. Approximately 52% of responses dealt with OCC transition issues; approximately 61% of responses mentioned procedural issues; and, approximately 18% of respondents addressed training issues. The process of transitioning is difficult. Certain procedures and training need improvement. Appendix G lists the comments made by specialists regarding their final comments.

3. Discussion

The goal of this survey effort was to evaluate and baseline each of the Communication and Coordination Questionnaire items. This has provided investigators with insight into how we can best facilitate the ongoing transition to the OCCs without an interruption or decrease in performance.

HFEs established ‘in-transition’ baselines for the instances when communication and coordination between facilities are needed, the medium of these communications, and the accuracy of the information that is shared. It is clear from the findings that there is a great deal of telephone use to coordinate events between facilities. The ranking of coordination events via telephone, from most frequent through most seldom, are for scheduled outages, unscheduled

outages, facility status updates, flight inspections, and weather conditions. Specialists agree that the information that they share with other facilities is accurate. As cited earlier, Ahlstrom et al. (2000) estimated that GMCC specialists spend as much as 50% of their time on the telephone performing coordination tasks. They also stated that one of the OCC transition goals is to reduce telephone use to 20 to 30%. In order to reach this 20 to 30% telephone usage goal, we suggest the use of some of the other modes of communication to ease the dependence on telephoning. However, this may be a very difficult goal to reach due to the NAS emphasis on "timely" coordination. As offered by one specialist, "Telephone communication is best for coordinating almost all outages/restoral actions/testing, etc. E-mail (cc-mail) is great for long lead items, project coordination, and cases where a 'history' must be maintained."

The collection of the task cohesion information has allowed HFEs to describe the current level of task cohesion for each facility, facility type, and a collapsed average for all facilities. There is a high level of task cohesion between the facilities. As Mullen and Copper (1994) have described, a more extensive interaction between group members over time probably lends a higher degree of "groupness." Hence, we anticipate that the task cohesion between AF sites will also increase with time. Further, as clearer definitions of responsibilities develop, communication and coordination will become more fluid. As Schlichter et al. (1997) suggest, an established and trusted relationship requires less coordination effort because there is a mutual understanding between the involved members.

HFEs found that no significant differences exist between the facilities for group size and cohesion. Based upon previous literature, this is a surprising finding. Many researchers have documented this group size-cohesion effect in many domains (see Mullen and Copper's (1994) meta-analytic review of 49 studies). It could be that the high level of professionalism and duration of AF job experience of this sample negated this common group size-cohesion effect.

As predicted from the cohesion literature, HFEs found a significant, negative correlation between cohesion and distance. That is, as the distance from a facility to its regional OCC increases, the level of task cohesion between those facilities decreases. As Podsakoff, MacKenzie, and Ahearne (1997) suggest, when groups are working interdependently and in close proximity, it is likely that cohesion will be enhanced. Therefore, one may expect a decrease of group task cohesion as the working distance between groups increase. Further, based on the comments provided by respondents and SMEs, this result may be due to 1) a lack of domain or facility-specific knowledge between facilities (i.e., weather considerations/differences: Dan Vickers, personal communication, August 1, 2001), 2) general connectivity problems (see Appendix G, #37), 3) a lack of timely and accurate interactions between facilities (see Appendix G, #9), 4) misinformation in POCs' databases (see Appendix G, # 84) and, 5) communication barriers, such as regional dialect differences (Dan Vickers, personal communication, August 1, 2001).

HFEs advise that direct comparisons between facilities may be feasible only if the baselines are adjusted for each facility's weather patterns and frequency of use, among other factors. Furthermore, differences in facility procedures and level of activity preclude direct comparisons. Also, it should be clear that the findings of this survey effort are results of the ongoing transition effort. It is not a baseline proper, but rather a baseline of transitioning AF facilities and

Specialists. We conducted this study just as the transition was initiated. Thus, the results may reflect some of this transition. We recommend a follow-up study investigating this relationship between task cohesion and distance for the fully operational OCCs and their regional sites. Further, the GEQ items employed in this present investigation are state dependent items (valid for one point in time) and not trait dependent items (consistent across time).

4. Recommendations

We recommend that task cohesion between OCCs and their facilities located at far distances be enhanced. Managers should be aware that, with distance, certain factors might impede communication and coordination. In particular, there may also be a need for OCC Specialists to gain knowledge of facility-specific patterns and/or problems at these farther sites. Acceleration of this facility specific knowledge may be accomplished by targeting efforts to facilitate the communications between OCCs and the more distant facilities. This approach may help in offsetting the task cohesion-distance effect observed for this sample. In addition, having the Help Desk position at the OCCs as a more permanent position rather than a rotational position (as described in the OPINE) might help. This will allow for the quicker building of rapport between the OCC and their regional facilities. Also, it may be of benefit to have any available specialists listen in (i.e., 3-way telephone calls) on the Help Desk calls to gain familiarity with the sites within its domain. Further, it may be that the change of group size will also influence this result.

In general, AF should employ the most current communications technologies. Regarding the use of telephone communications, HFEs suggest that it is possible for specialists to streamline their telephone use by employing more teleconferencing, or 3-way calling. As shown previously, the second most frequent medium of communication between OCCs and GMCCs was the use of teleconferencing. This should decrease the total number of calls made. It has been shown that the coordination of events may be more effective if all involved parties are included from the start. For example, Bornstein et al. (1989) found that when group members use the opportunity for preplanned discussions to coordinate their strategies and work as a group, performance is enhanced. Further, teleconferencing is a form of "synchronous communication" where all participants are included at the same time. One advantage of this type of communication is that the caller can get everyone's input quickly. Also, it allows real-time interaction, and it is helpful in bringing a group to consensus (Boettcher, 2000).

References

- Ahlstrom, V., Koros, A., & Heiney, M. (2000). *Team processes in Airway Facilities operations control centers* (DOT/FAA/CT-TN00/14). Atlantic City International Airport, NJ: DOT/FAA William J. Hughes Technical Center.
- Aquino, K., & Reed, A., II. (1998). A social dilemma perspective on cooperative behavior in organizations: The effects of scarcity, communication, and unequal access on the use of a shared resource. *Group and Organizational Management*, 23, 390-413.
- Bailey, K. D. (1994). *Methods of social research* (4th ed.). New York: Macmillan.
- Boettcher, S. (2000, August) Getting your members to interact. Workz.com: Helping small businesses grow and prosper online. Retrieved May 9, 2001, from <http://www.workz.com>
- Bornstein, G., Rapoport, A., Kerpel, L., & Katz, T. (1989). Within and between-group communication in intergroup competition for public goods. *Journal of Experimental Social Psychology*, 25, 422-436.
- Carless, S. A. (2000). Reply to Carron & Brawley. *Small Group Research*, 31, 107-118.
- Carron, A. V., & Brawley, L. R. (2000). Cohesion: Conceptual and measurement issues. *Small Group Research*, 31, 89-106.
- Carron, A. V., Widmeyer, W. N., & Brawley, L. R. (1985). The development of an instrument to assess cohesion in sports teams: The group environment questionnaire. *Journal of Sport Psychology*, 7, 244-266.
- CTA, Inc. (1993). *Airway Facilities job task analysis: Vol. 2 ARTCC NAS Operations Manager*. Atlantic City International Airport, NJ: Federal Aviation Administration Technical Center.
- Dillman, D. A. (2000). *Mail and Internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons, Inc.
- Federal Aviation Administration. (1997). *Southern California TRACON GNAS maintenance control center: Work activity baseline analysis*. Washington, DC: Author.
- Federal Aviation Administration. (1999). *Operational guidance for NAS infrastructure management* (Version 1.1). Washington, DC: Author.
- Federal Aviation Administration, & OMNI Corporation. (2001). *2000 employee attitude survey: Summary of results for Airway Facilities overall*. Washington, DC: Author.

- Federal Aviation Administration, & PASS President. (March 29, 2001). Memorandum of Agreement (MOA): OCC transition and standardization plan. Washington, DC: Author.
- Fleishman, E. A., & Zaccaro, S. J. (1992). *Toward a taxonomy of team performance functions*. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance*. Norwood, NJ: Ablex.
- Gully, S. M., Devine, D. J., & Whitney, D. J. (1995). A meta-analysis of cohesion and performance: Effects of level of analysis and task interdependence. *Small Group Research*, 26, 497-520.
- Hackman, J. R. (1992). Group influences on individuals in organizations. In M. D. Dunnette & L. M. Hough (Vol. Eds.), *Handbook of industrial and organizational psychology*: Vol. 3. (2nd ed., pp. 199-267). Palo Alto, CA: Consulting Psychologists Press.
- Hah, S. (2002). *Coordination between Airway Facilities Specialists and Air Traffic Personnel* (DOT/FAA/CT-TN02/07). Atlantic City International Airport, NJ: DOT/FAA William J. Hughes Technical Center.
- Irmsher, K. (1996). *Communication skills*. ERIC Digest (No. 102, pp. 1-5). Eugene, OR: ERIC Clearinghouse on Educational Management.
- Jarvenpaa, S. L., & Leidner, D. E. (1998). Communication and trust in global virtual teams. *Journal of Computer-Mediated Communication*, 3, 1-42.
- Langfred, C. W. (1998). Is group cohesiveness a double-edged sword? An investigation of the effects of cohesiveness on performance. *Small Group Research*, 29, 124-143.
- Lewis, L. K. (2000). "Blindsided by that one" and "I saw that one coming." The relative anticipation and occurrence of communication problems and other problems in implementers' hindsight. *Journal of Applied Communication Research*, 28, 44-67.
- McGrath, J. E., & Berdahl, J. L. (1998). Groups, technology, and time: Use of computers for collaborative work. In R. Scott Tindale & Linda Heath, et al. (Eds.), *Theory and research on small groups* (pp. 205-228). New York: Plenum Press.
- McMannis Associates, Inc. (1994). *Airway Facilities organizational effectiveness study* (Final Report, September 30). Atlantic City International Airport, NJ: Federal Aviation Administration Technical Center.
- Mohan, S. (1998, June). New technology makes communication harder and easier. *InfoWorld*. Available from <http://www.britannica.com>
- Mullen, B., & Copper, C. (1994). The relation between group cohesiveness and performance: An integration. *Psychological Bulletin*, 115, 210-227.

- O'Reilly, C. A., III. (1980). Individuals and information overload in organizations: Is more necessarily better? *Academy of Management Journal*, 23, 684-696.
- Podsakoff, P. M., MacKenzie, S. B., & Ahearne, M. (1997). Moderating effects of goal acceptance on the relationship between group cohesiveness and productivity. *Journal of Applied Psychology*, 82, 974-983.
- Riordan, C. M., & Weatherly, E. W. (1999). Defining and measuring employees' identification with their work groups. *Educational and Psychological Measurement*, 59, 310-324.
- Rousseau, D. M. (1985). Issues of level in organizational research: Multi-level and cross-level perspectives. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 7, pp. 1-37). Greenwich, CT: JAI.
- Schlicter, J., Koch, M., & Burger, M. (1997). Workspace awareness for distributed teams. In W. Conen (Ed.), *Workshop Coordination Technology for Collaborative Applications Proceedings* (pp. 199-218). Singapore.
- Systems Flow, Inc. (1994). *Job task analysis for Maintenance Control Center (GMCC) Specialists*. Washington, DC: Federal Aviation Administration, Office of Operational Planning and Policy (AOP-200).
- Truitt, T. R., & Ahlstrom, V. (2000). *Situation awareness in Airway Facilities: Replacement of maintenance control centers with operation control centers* (DOT/FAA/CT-TN00/09). Atlantic City International Airport, NJ: DOT/FAA William J. Hughes Technical Center.
- Wech, B. A., Mossholder, K. W., Steel, R. P., & Bennett, N. (1998). Does work group cohesiveness affect individuals' performance and organizational commitment? A cross-level examination. *Small Group Research*, 29, 472-494.
- Zaccaro, S. J. (1990). Nonequivalent associations between forms of cohesiveness and group-related outcomes: Evidence for multidimensionality. *Journal of Social Psychology*, 131, 387-399.

Acronyms

AF	Airway Facilities
AMCC	Air Route Traffic Control Center Maintenance Control Center
ANOVA	Analysis of Variance
ARTCC	Air Route Traffic Control Center
AT	Air Traffic
ATCT	Air Traffic Control Tower
CMC	Computer Mediated Communications
EAS	Employee Attitude Survey
FAA	Federal Aviation Administration
FTF	Face-To-Face
GEQ	Group Environment Questionnaire
GMCC	GNAS Maintenance Control Center
GNAS	General National Airspace System
HFE	Human Factors Engineer
NAS	National Airspace System
NOM	NAS Operations Manager
OCC	Operations Control Center
OPINE	Operating Procedures in the NAS Environment
PASS	Professional Airways Systems Specialist
POC	Point of Contact
SME	Subject Matter Expert
SOC	Service Operations Center
SOP	Standard Operating Procedure
TRACON	Terminal Radar Approach Control

Appendix A

Communication and Coordination Questionnaire

This questionnaire is designed to explore how Airway Facilities (AF) specialists communicate and coordinate between the GMCCs, OCCs and SOC. There are no right or wrong answers. We are interested in knowing your experience and opinions on this topic. Further, you were chosen by a scientific sampling procedure. In effect, you are actually answering for other specialists who were not selected to respond to this important investigation.

Data from your responses, including demographic information, will be **anonymous** and **confidential**. You will not be identified by name or description. Your answers will be combined with those of others and summary information will be reported.

This questionnaire is voluntary. You may stop answering this questionnaire at any time without consequence. There is no anticipated risk in participating in this questionnaire.

The benefit to you from the results of this study includes a better understanding of communication and coordination processes between GMCCs, OCCs and SOC. This will help to make the operation of the NAS more efficient and safer.

This study is very important for the FAA to understand what communication processes AF specialists use for coordination efforts. The FAA will use the research results to aid in the transition to the OCCs.

Your cooperation is greatly appreciated. We designed this questionnaire to be completed in approximately 15 minutes. If you have any questions, please do not hesitate to contact Vicki Ahlstrom or Dr. Victor Ingurgio at the following addresses.

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FAX: 609/485-6218

GENERAL INFORMATION

There are no right or wrong answers, so please give your immediate reactions. Some of the questions may seem repetitive but please answer all questions. Your responses are very important to us. When you finish the questionnaire, please place it in the confidential and pre-paid return envelope and mail it to us as soon as possible.

Date _____

Facility Name _____

This part of the questionnaire gathers general information about communication and coordination.

1. Facility Type: **GMCC** **OCC** **SOC** **Other** _____

(Circle one)

1a. If you are currently with a GMCC, are you transferring to an OCC? **Yes** **No**

1b. If you are currently with an OCC, did you transfer from a GMCC? **Yes** **No**

2. Which of the following are you certified in? (circle all that apply)

NAVAIDS Environmental Automation Communications RADAR Weather

Other (please specify) _____

3. What is your job title? _____

4. How long have you worked at each of the following?

GMCC: _____ Years _____ Months

OCC: _____ Years _____ Months

SOC: _____ Years _____ Months

5. How long have you worked for AF? _____ Years _____ Months

6. Would you consider the past week's workload as average? **Yes** **No** (circle one)

6a. If no, was the past week's workload **Greater than average** / **Less than average**?

(circle one)

7. What percentage of the time do you use your Standard Operating Procedures (SOP/OPINES) to make job-related decisions? _____%

8. Do you think that the SOP for your position is a good resource for making job-related decisions? **Yes** **No** (circle one)

8a. Why or why not?

PART A. COMMUNICATION MEDIUMS BETWEEN FACILITIES

This part of the communication and coordination questionnaire is designed to assess the use of different communication mediums (i.e., telephone, e-mail, etc.) used on your job. Please note that cc:Mail = e-mail.

1. How many telephone calls did you **make** during the past week to a: (Please provide your best estimate)

GMCC _____

OCC _____

SOC _____

2. How many telephone calls did you **receive** during the past week from a: (Please provide your best estimate)

GMCC _____

OCC _____

SOC _____

3. How many cc:Mails did you **make** during the past week to a: (Please provide your best estimate)

GMCC _____

OCC _____

SOC _____

4. How many cc:Mails did you **receive** during the past week from a: (Please provide your best estimate):

GMCC _____

OCC _____

SOC _____

5. When you coordinate with **OCCs**, what percentage of the time do you use the following communication mediums? [Percentages (%) should add to 100].

_____ % Face-to-face

_____ % TELEPHONE

_____ % cc:Mail

_____ % Internet

_____ % FAX

_____ % Meetings (more than 2 people)

_____ % Video conferencing

_____ % Tele-conferencing

_____ % Other (Please specify) _____

6. When you coordinate with **GMCCs**, what percentage of the time do you use the following communication mediums? [Percentages (%) should add to 100].

_____ % Face-to-face
_____ % TELEPHONE
_____ % cc:Mail
_____ % Internet
_____ % FAX
_____ % Meetings (more than 2 people)
_____ % Video conferencing
_____ % Tele-conferencing
_____ % Other (Please specify) _____

7. When you coordinate with **SOCs**, what percentage of the time do you use the following communication mediums? [Percentages (%) should add to 100].

_____ % Face-to-face
_____ % TELEPHONE
_____ % cc:Mail
_____ % Internet
_____ % FAX
_____ % Meetings (more than 2 people)
_____ % Video conferencing
_____ % Tele-conferencing
_____ % Other (Please specify) _____

8. When you coordinate with **OCCs**, what percentage of the time do you coordinate with the following personnel? [Percentages (%) should add to 100].

_____ % Field Technician
_____ % Another OCC Specialist
_____ % A SOC Specialist
_____ % A GMCC Specialist

9. When you coordinate with **SOCs**, what percentage of the time do you coordinate with the following personnel? [Percentages (%) should add to 100].

_____ % Field Technician
_____ % Another SOC Specialist
_____ % An OCC Specialist

10. When you coordinate with **GMCCs**, what percentage of the time do you coordinate with the following personnel? [Percentages (%) should add to 100].

_____ % Field Technician
_____ % Another GMCC Specialist
_____ % A SOC Specialist
_____ % An OCC Specialist

11. Please provide the percent of time in which you have communicated with **OCCs** regarding the following events and communication mediums.

	N/A	Telephone	cc:Mail	Other
a. Facility status updates	_____	_____%	_____%	_____%
b. System outages (e.g., RADAR or ILS shutdown)	_____	_____%	_____%	_____%
c. Weather conditions	_____	_____%	_____%	_____%
d. Scheduled outages	_____	_____%	_____%	_____%
e. Unscheduled outages	_____	_____%	_____%	_____%
f. Flight inspections	_____	_____%	_____%	_____%

12. Please provide the percent of time in which you have communicated with **GMCCs** regarding the following events and communication mediums.

	N/A	Telephone	cc:Mail	Other
a. Facility status updates	_____	_____%	_____%	_____%
b. System outages (e.g., RADAR or ILS shutdown)	_____	_____%	_____%	_____%
c. Weather conditions	_____	_____%	_____%	_____%
d. Scheduled outages	_____	_____%	_____%	_____%
e. Unscheduled outages	_____	_____%	_____%	_____%
f. Flight inspections	_____	_____%	_____%	_____%

13. Please provide the percent of time in which you have communicated with **SOCs** regarding the following events and communication mediums.

	N/A	Telephone	cc:Mail	Other
a. Facility status updates	_____	_____%	_____%	_____%
b. System outages (e.g., RADAR or ILS shutdown)	_____	_____%	_____%	_____%
c. Weather conditions	_____	_____%	_____%	_____%
d. Scheduled outages	_____	_____%	_____%	_____%
e. Unscheduled outages	_____	_____%	_____%	_____%
f. Flight inspections	_____	_____%	_____%	_____%

PART B. COMMUNICATION AND COORDINATION PROCEDURES

<p>This part of the communication and coordination questionnaire is designed to assess your perceptions of the communication and coordination processes between certain facilities.</p> <p>Rate each item on the adjacent 6-point scale. Please fill in the appropriate circle corresponding to your responses for each item pertaining to each facility type--GMCCs, OCCs, and SOC.</p>	<div style="display: flex; justify-content: space-between;"> <div style="text-align: left;"> <p>Strongly Disagree</p> <p>Moderately Disagree</p> <p>Slightly Disagree</p> </div> <div style="text-align: right;"> <p>Slightly Agree</p> <p>Moderately Agree</p> <p>Strongly Agree</p> </div> </div>						
Item	Facility Type	1	2	3	4	5	6
1. There are clearly defined procedures for coordinating between this facility and another _____:	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
2. Sometimes facilities need to share specialists with another facility (e.g., for disaster response teams). Is there a general willingness to participate in the sharing of specialists between this facility and other _____?	GMCCs	1	2	3	4	5	6
	OCCs	1	2	3	4	5	6
	SOCs	1	2	3	4	5	6
3. Sometimes facilities need to share equipment with another facility to assist with field needs. Is there a general willingness to participate in the sharing of equipment between this facility and other _____ to assist with field needs?	GMCCs	1	2	3	4	5	6
	OCCs	1	2	3	4	5	6
	SOCs	1	2	3	4	5	6
4. Sometimes facilities need to share spare parts with another facility to assist with field needs. Is there a general willingness to participate in the sharing of spare parts between this facility and other _____ to assist with field needs?	GMCCs	1	2	3	4	5	6
	OCCs	1	2	3	4	5	6
	SOCs	1	2	3	4	5	6
5. The sharing of specialists (e.g., for disaster response teams) between this facility and another _____ occurs often.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
6. The amount of sharing of equipment between this facility and another _____ is adequate for coordinating a return to service.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
7. The amount of sharing of spare parts between this facility and another _____ is adequate for coordinating a return to service.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
8. The amount of communications between this facility and other _____ is adequate for the completion of coordinating efforts between the two facilities.	GMCCs	1	2	3	4	5	6
	OCCs	1	2	3	4	5	6
	SOCs	1	2	3	4	5	6
9. We work as a team whenever there are coordination events between this facility and other _____.	GMCCs	1	2	3	4	5	6
	OCCs	1	2	3	4	5	6
	SOCs	1	2	3	4	5	6
10. I have communicated in a timely manner with another _____ about coordinating a return to service event.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6

Item	Facility Type	<div style="display: flex; justify-content: space-between; padding: 5px;"> <div>Strongly Disagree</div> <div>Moderately Disagree</div> <div>Slightly Disagree</div> <div>Slightly Agree</div> <div>Moderately Agree</div> <div>Strongly Agree</div> </div>					
		①	②	③	④	⑤	⑥
11. The teamwork within this facility is adequate for the completion of coordinating efforts between this facility and other ____.	GMCCs	①	②	③	④	⑤	⑥
	OCCs	①	②	③	④	⑤	⑥
	SOCs	①	②	③	④	⑤	⑥
12. Overall, the coordination between this facility and other ____ is adequate.	GMCCs	①	②	③	④	⑤	⑥
	OCCs	①	②	③	④	⑤	⑥
	SOCs	①	②	③	④	⑤	⑥
13. Coordination response times between this facility and other ____ are adequate.	GMCCs	①	②	③	④	⑤	⑥
	OCCs	①	②	③	④	⑤	⑥
	SOCs	①	②	③	④	⑤	⑥
14. Coordination procedures are well established between this facility and other ____:	GMCCs	①	②	③	④	⑤	⑥
	OCCs	①	②	③	④	⑤	⑥
	SOCs	①	②	③	④	⑤	⑥
15. There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have telephoned another ____ to coordinate a boundary sharing issue in a timely manner.	GMCC	①	②	③	④	⑤	⑥
	OCC	①	②	③	④	⑤	⑥
	SOC	①	②	③	④	⑤	⑥
16. There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have cc:Mailed another ____ to coordinate a boundary sharing issue in a timely manner.	GMCC	①	②	③	④	⑤	⑥
	OCC	①	②	③	④	⑤	⑥
	SOC	①	②	③	④	⑤	⑥
17. When coordinating with another ____, this facility receives accurate information.	GMCC	①	②	③	④	⑤	⑥
	OCC	①	②	③	④	⑤	⑥
	SOC	①	②	③	④	⑤	⑥
18. When coordinating with another ____, this facility receives information in a timely manner.	GMCC	①	②	③	④	⑤	⑥
	OCC	①	②	③	④	⑤	⑥
	SOC	①	②	③	④	⑤	⑥
19. Overall, this facility spends a great deal of time coordinating with other ____.	GMCCs	①	②	③	④	⑤	⑥
	OCCs	①	②	③	④	⑤	⑥
	SOCs	①	②	③	④	⑤	⑥
20. I prefer to communicate with another ____ by cc:Mail when working on a coordination event.	GMCC	①	②	③	④	⑤	⑥
	OCC	①	②	③	④	⑤	⑥
	SOC	①	②	③	④	⑤	⑥

Item	Facility Type	<div style="text-align: right;">Strongly Agree</div> <div style="text-align: center;">Moderately Agree</div> <div style="text-align: center;">Slightly Agree</div> <div style="text-align: center;">Slightly Disagree</div> <div style="text-align: center;">Moderately Disagree</div> <div style="text-align: left;">Strongly Disagree</div>					
		1	2	3	4	5	6
21. I prefer to communicate with another _____ by telephone when working on a coordination event.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
22. I prefer to communicate with another _____ by intranet (i.e., Event Ticket) when working on a coordination event.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
23. We all try to assist with any coordination efforts that may occur between this facility and other _____.	GMCCs	1	2	3	4	5	6
	OCCs	1	2	3	4	5	6
	SOCs	1	2	3	4	5	6
24. I have the necessary tools (i.e., telephone, computer, software) to communicate with another _____ when needed.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
25. I have received the necessary training to communicate with another _____ when needed.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6
26. When communicating with another _____, I have enough time to fully coordinate the current task.	GMCC	1	2	3	4	5	6
	OCC	1	2	3	4	5	6
	SOC	1	2	3	4	5	6

Based on your responses above, please provide any comments that you wish to add to justify your responses. Please list the item number and facility type, followed by your comments (e.g., Item: #3, Facility Type: OCC; we have never shared spare parts).

Thank you for your cooperation!

Appendix B

Consent Form

FAA William J. Hughes Technical Center Research and Development Human Factors Laboratory

Individual's Consent to Voluntary Participation in a Research Study

I, _____, understand that this study, entitled "Communication and Coordination between Airway Facilities: Implications for OCCs" is sponsored by the Federal Aviation Administration and is being directed by the Research and Development Human Factors Laboratory.

Nature and Purpose:

I have been recruited to volunteer as a participant in the project named above. The purpose of the study is to obtain specialists' perceptions regarding communication and coordination patterns. The purpose of this study is not to rate or judge in any way the perceptions of the volunteer participants, but instead to collect communication and coordination information from specialists within and between varying AF contexts via questionnaires.

Experimental Procedures:

As a participant, I will work as I normally do. I will complete the communication and coordination questionnaire when possible. Any and all of my questions will be answered. I understand that all collected information is for use within the Research and Development Human Factors Laboratory only.

Discomforts and Risks:

No mental or physical risks or adverse effects are anticipated. However, during the course of the study, I will be made aware of any significant new findings that may affect my decision to remain in the study.

Benefits:

I understand that the only direct benefit to me is the satisfaction of knowing that I contributed to the understanding about how specialists communicate and coordinate within the AF environment. Results from this study will provide a foundation upon which to conduct future research.

Participant's Responsibilities:

By agreeing to participate in this project, I assume the responsibility to refrain from behavior that may impact the safety of others or the integrity of the survey. This includes being alcohol and drug free at questionnaire time. I agree to not discuss any details of the survey with other participants or potential participants until the study has been completed.

Compensation and Injury:

I agree to immediately report any injury or suspected adverse effect to Vicki Ahlstrom at (609) 485-5643.

Participant's Assurances:

I understand that my participation in this study is completely voluntary. I am participating because I want to. Vicki Ahlstrom or Dr. Victor Ingurgio has adequately answered any and all questions I have about this study, my participation, and the procedures involved. I understand that Vicki Ahlstrom or Dr. Victor Ingurgio will be available to answer any questions concerning procedures throughout this study.

I understand that if new findings develop during the course of this research that may relate to my decision to continue participation, I will be informed.

I have not given up any of my legal rights or released any individual or institution from liability for negligence.

I understand that records of this study will be kept confidential, and that I will not be identifiable by name or description in any reports or publications about this study.

I understand that I may withdraw from this study at any time without penalty or loss of benefits to which I am otherwise entitled.

I also understand that the principal investigator of this study may terminate my participation if he feels this to be in my best interest.

If I have questions about this study or need to report any adverse effects from the research procedures, I will contact Vicki Ahlstrom at (609) 485-5643.

Signature Lines:

I have read this consent statement. I understand its contents, and I freely consent to participate in this study under the conditions described. I have received a copy of this consent form. Further, this consent form will be collected separately from the communication and coordination questionnaire so that participants' answers will remain anonymous and confidential. I understand that the communication and coordination questionnaire requires no signatures.

Research Participant: _____ **Date:** _____

Investigator: _____ **Date:** _____

Witness: _____ **Date:** _____

Appendix C

Self-Administered Surveys versus Interview Techniques

From Kenneth D. Bailey's (1994) *Methods of Social Research* (4th Edition).

Advantages of Self-Administered Surveys

1. *Considerable savings of money.* Interview costs are rising these days, as are all labor costs. Costs of \$15 or more per interview (not including sampling or data analysis) are common, and costs of \$30 or more per interview are not unusual. Many interview study directors conduct long and costly interviewer-training sessions, hire one or more project supervisors or interview supervisors, and even open field offices in the community to recruit and train interviewers and to conduct public relations. Although the questionnaire in a mailed study generally has to be more expansive than the instrument used in an interview study, perhaps with high quality paper and printing and an elaborate cover, a mailed study still costs far less than an interview study with the same sample size. This is true even if first-class or airmail postage is used and there are several follow-up mailings, including more than one questionnaire sent to the same respondent.
2. *Time Savings.* Mailed questionnaires can be sent to all respondents simultaneously, and most of the replies will be received within a week or so (although the final returns may take several weeks or longer), while interviews are generally performed sequentially and may take months to complete.
3. *The questionnaire may be completed at the respondent's convenience.* The respondent may spend more total time on it than he or she might in an interview study, as he or she is not forced to complete all questions at one time. With the mailed questionnaire, the respondent is free to answer a question or two whenever he or she has a spare moment. The respondent is also able to answer the easy questions first and take time to think about answers to the more difficult ones.
4. *Greater assurance of anonymity.* Since there is no interviewer present who can identify him or her later, the respondent may be more willing to provide socially undesirable answers, or answers that violate norms.
5. *Standardized wording.* Comparison of respondents' answers is facilitated by the fact that each respondent is exposed to exactly the same wording. However, this advantage may be lessened by differential understanding of questions due to differences in educational levels among respondents.
6. *No interviewer bias.* There is no opportunity for the respondent to be biased by an interviewer. An interviewer can bias answers in many ways, such as prompting, through voice inflection, assuming that the respondent will answer a certain way, or telling the respondent his or her personal opinion. There is also the possibility that the interviewer will misread the question, the respondent will misunderstand the respondent, or the interviewer will make a clerical error.
7. *Securing information.* The mailed questionnaire allows the respondent to consult his or her records, confer with colleagues, or conduct research before answering, while the interview generally does not.
8. *Accessibility.* Respondents who are widely separated geographically can all be reached for the price of a postage stamp, as compared to expensive travel costs for interviewers.

Disadvantages of Self-Administered Surveys

1. *Lack of flexibility.* With no interviewer present, there can be no variation in questions asked and no probing for a more specific answer if the respondent's first answer is too vague or general to be useful. In addition, if the respondent misunderstands the question he or she cannot be corrected. Further, there is no interviewer present to "save" the situation by mollifying an irate respondent who dislikes a particular question. Mail surveys not only often receive higher response rates to socially undesirable questions, they also get more than their share of insults and obscenities from irate respondents who feel strongly about a question or the subject being studied.
2. *Low response rate.* In an interview study, the vast majority of interviews are successfully completed, and the reasons for non-responses are generally known (e.g., respondent's death). Furthermore, the respondents who do not answer are generally not a random selection of the sample but have some biasing characteristics. For example, the elderly are more likely to be ill and unable to respond. The more mobile are less likely to have a current address and thus are less likely to receive the questionnaire. The poorly educated are unable to read the questionnaire and write the answers. Even many highly educated people feel that they can express themselves better through speaking than through writing, or are simply too lazy to write lengthy paragraphs, or feel that their grammar or spelling is not adequate given their educational level, and thus feel embarrassed to tender a written response.
3. *Verbal behavior only.* There is no interviewer present to observe nonverbal behavior or to make personal assessments concerning the respondent's ethnicity, social class, and other pertinent characteristics. An obviously lower-class respondent may pass himself or herself off as upper class in a mailed questionnaire, with no challenge from an interviewer.
4. *No control over environment.* In interview studies, the interviewer often takes great pains to ensure that a standardized environment exists for every interview. For example, the interview will be conducted in private without spouse or other family present to hear answers, and the interviewer will try to make sure that the room is quiet and that the respondent is not rushed or nervous. In a mailed questionnaire study there is no assurance that the respondent will be able to complete the answers in private. A spouse or parent might demand to see the completed questionnaire and censor it. What is worse, some other person might fill out the questionnaire for the respondent if the respondent feels he or she does not qualify or is too busy.
5. *No control over question order.* A respondent who reads the entire questionnaire before answering, skips some questions, or does not answer questions in the order in which they are presented may ruin a masterpiece of question order.
6. *Many questions may remain unanswered.* With no supervision while filling in the questionnaire, the respondent may leave some questions unanswered. Thus while 60 percent of all questionnaires may be returned, the researcher might find that only 10 percent of the respondents answered a particularly sensitive question.
7. *Cannot record spontaneous answers.* It is difficult to gather spontaneous first opinions, as the respondent has an opportunity to erase a hasty answer that he or she later decides is not diplomatic.

8. *Difficult to determine reasons for non-responses.* Although some questionnaires that fail to reach the respondent are returned to the researcher, many fall into the hands of new tenants who throw them away, while others are forwarded to a second bad address rather than being returned.
9. *No control over date of response.* Lack of control over the time the questionnaire is completed can damage a study greatly. For example, if one is studying natural disasters and a hurricane or earthquake occurs when half the respondents have completed their questionnaires, this would be obvious in comparing answers before and after the disaster. However, this is also a problem with interview studies. An interviewer can choose the time he or she arrives at the house, but cannot guarantee that the respondent will be home or will agree to the interview. Further, interviews are so time consuming that they generally cannot all be completed on the same day, while, at least in theory, mailed questionnaires could all arrive the same day.
10. *Cannot use complex questionnaire format.* Not only must the questions on a mailed questionnaire generally be simpler to understand, but a complex format with many contingency questions is also probably too confusing for the average respondent. Highly complex questionnaires can be used in interview studies in many cases only because the interviewer had been given extensive training in understanding the format. Obviously, the respondent in a mailed study cannot receive such training and will generally give up on a questionnaire full of arrows and skips. Further, question wording must be simple enough for the most poorly educated person in the sample to understand. This lower common denominator may result in such simplistic questions that the more highly educated respondents feel that their intelligence has been insulted.
11. *Possibly biased sample.* It is possible that respondents (and non-respondents) are not a random sample of the entire sample but are generally biased in some fashion. Non-respondents tend to be more poorly educated and more highly mobile. In addition, on a very emotional or controversial issue, the researcher may receive a bimodal response, with those strongly in favor and strongly opposed both responding and neutral persons not responding.

Advantages of Interview Techniques

1. *Flexibility.* One major advantage of the interview is its flexibility. Interviewers can probe for more specific answers and can repeat a question when the response indicates that the respondent misunderstood. It may be that different questions are appropriate for different respondents; the interview situation makes it possible for the interviewer to decide what questions are appropriate, rather than writing them all in advance as the researcher must do for the mailed study.
2. *Response rate.* The interview tends to have a better response rate than the mailed questionnaire. Persons who are unable to read and write can still answer questions in an interview, and others who are unwilling to expend the energy to write out their answers may be glad to talk. Many people simply feel more confident of their speaking ability than of their writing ability.
3. *Nonverbal behavior.* The interviewer is present to observe nonverbal behavior and to assess the validity of the respondent's answer.

4. *Control over environment.* An interviewer can standardize the interview environment by making certain that the interview is conducted in privacy, that there is no noise, and so on, in contrast to the mailed study, where the questionnaires may be completed by different people under drastically different conditions.
5. *Question order.* The interviewer has control over question order and can ensure that the respondent does not answer the questions out of order or in any other way thwart the structure of the questionnaire.
6. *Spontaneity.* The interviewer can record spontaneous answers. The respondent does not have the chance to retract his or her first answer and write another, as is possible with a mailed questionnaire. Spontaneous answers may be more informative and less normative than answers about which the respondent has had time to think.
7. *Respondent alone can answer.* The respondent is unable to "cheat" by receiving prompting or answers from others, or by having others complete the entire questionnaire for him or her, as often happens in mailed studies.
8. *Completeness.* The interviewer can ensure that all of the questions are answered.
9. *Time of interview.* The interviewer can record the exact time, date, and place of the interview. Thus if some important event has occurred during the course of the study that may cause changes in the respondent's answers, the researcher has a chance to compare answers before and after the event. In a mailed survey, he or she has only postmarks as clues to which questionnaires were answered before the event and which after.
10. *Greater complexity of questionnaire.* A more complex questionnaire can be used in an interview study. A skilled, experienced, and well-trained interviewer can work with a questionnaire so full of skips, charts and graphs, arrows, detailed instructions, and various other contingencies that even a well-educated respondent would feel hopelessly lost or at least intimidated if he or she received it in the mail.

Disadvantages of Interview Techniques

1. *Cost.* Interview studies can be extremely costly. The more complex studies require small bureaucracies with a host of administrators, field supervisors, interviewers, and perhaps even public relations personnel. Sampling is often costly. Interview schedules can also be costly to construct and reproduce. In addition, interviewers must be paid not only for the hours that they interview but also for training periods, and they must be reimbursed for travel expenses.
2. *Time.* Interviews are often lengthy and may require the interviewer to travel miles. In addition, the interviewer must arrange the interview for times when the respondent is available. Sometimes an interviewer can complete only one or a few interviews each day, even though the actual interviewing times may be relatively brief. Further, it is not uncommon for an interviewer to return to an address three or more times before an interview is finally granted. Interviewing may take as long as six months in studies with large sample or with respondents who are not geographically centralized. Unfortunately, many events can occur over such a long period that may affect the answers received.
3. *Interview bias.* The interviewer serves a useful function in making sure that all questions are answered and that the respondent understands the instructions and the questions. However, the interviewer can also cause error. He or she may misunderstand the respondent's answer, may understand it but make a clerical error in recording it, or may

simply record an answer even when the respondent failed to reply. In addition, the respondent's answers can be affected by his or her reaction to the interviewer's sex, race, social class, age, dress and physical appearance, or accent.

4. *No opportunities to consult records.* Compared to the mailed questionnaire, the interview generally does not provide the respondent time to conduct research, to check records, to consult family and friends about facts, or to ponder his or her reply.
5. *Inconvenience.* It has been shown repeatedly that a person's reasoning ability is adversely affected by such factors as fatigue, stress, illness, heat, and density. The mailed questionnaire provides the best opportunity for the respondent to answer when the adverse factors are at a minimum, even if it means completing the questionnaire a few questions at a time rather than all at once. In contrast, the respondent may give answers in an interview situation that are less than his or her best effort merely because the interviewer arrived when the baby was crying, the dog was barking, dinner was burning, and the respondent needed to go to the bathroom.
6. *Less anonymity.* The interview offers less assurance of anonymity than the mailed questionnaire study, particularly if the latter includes no follow-up. The interviewer typically knows the respondent's name and address and often his or her telephone number as well. Further, in listing the members of the household, the interviewer often receives the names of the very persons from whom the respondent wishes the information given in the interview withheld. Thus, the interviewer poses a potential threat to the respondent, particularly if the information is incriminating, embarrassing, or otherwise sensitive. The respondent can minimize the threat by refusing to respond, or else trust the interviewer not to release the information in any manner that can identify the respondent.
7. *Less standardized question wording.* It may be necessary for the interviewer to probe a great deal, to phrase the same question differently for different respondents, or even to ask different questions of different respondents. While this flexibility can be an advantage, it can also be a disadvantage if it makes it difficult for the researcher to compare respondents' answers.
8. *Lack of accessibility to respondents.* The fact that respondents live in 12 different states may make little difference to a researcher conducting a mailed questionnaire study, as all can be reached for the price of a stamp. However, travel costs for interviewing in all 12 states may be exorbitant and may prove impossible.

Appendix D

Specialists' Communication Preferences When Coordinating Events

Part B: Item 1a: There are clearly defined procedures for coordinating between this facility and another GMCC				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	72.15%	75.00%	60.00%	71.43%
% Disagree	27.85%	25.00%	40.00%	28.57%
Part B: Item 1b: There are clearly defined procedures for coordinating between this facility and another OCC				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	47.62%	40.91%	55.56%	46.15%
% Disagree	52.38%	59.09%	44.44%	53.85%
Part B: Item 1c: There are clearly defined procedures for coordinating between this facility and another AMCC				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	66.67%	52.38%	62.50%	72.97%
% Disagree	33.33%	47.62%	37.50%	27.03%
Part B: Item 12a: Overall, the coordination between this facility and another GMCC is adequate				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	89.47%	84.00%	100.00%	87.88%
% Disagree	10.53%	16.00%	0.00%	12.12%

Part B: Item 12b: Overall, the coordination between this facility and another OCC is adequate				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	68.83%	63.16%	83.33%	64.86%
% Disagree	31.17%	36.84%	16.67%	35.14%
Part B: Item 12c: Overall, the coordination between this facility and another AMCC is adequate				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	92.00%	85.00%	92.86%	94.74%
% Disagree	8.00%	15.00%	7.14%	5.26%

Part B: Item 13a: Coordination response times between this facility and another GMCC are adequate				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	85.33%	83.33%	92.31%	82.35%
% Disagree	14.67%	16.67%	7.69%	17.65%
Part B: Item 13b: Coordination response times between this facility and another OCC are adequate				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	64.86%	66.67%	82.35%	55.56%
% Disagree	35.14%	33.33%	17.65%	44.44%

Part B: Item 13c: Coordination response times between this facility and another AMCC are adequate				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	86.49%	85.00%	84.62%	86.84%
% Disagree	13.51%	15.00%	15.38%	13.16%

Part B: Item 14a: Coordination procedures are well established between this facility and another GMCC				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	75.32%	69.23%	64.29%	81.82%
% Disagree	24.68%	30.77%	35.71%	18.18%

Part B: Item 14b: Coordination procedures are well established between this facility and another OCC				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	50.65%	36.84%	66.67%	51.35%
% Disagree	49.35%	63.16%	33.33%	48.65%

Part B: Item 14c: Coordination procedures are well established between this facility and another AMCC				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	78.67%	65.00%	64.29%	89.47%
% Disagree	21.33%	35.00%	35.71%	10.53%

Part B: Item 15a: There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have telephoned another GMCC to coordinate a boundary sharing issue in a timely manner

	AF Average	GMCCs	OCCs	AMCCs
% Agree	93.24%	92.00%	92.31%	93.94%
% Disagree	6.76%	8.00%	7.69%	6.06%

Part B: Item 15b: There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have telephoned another OCC to coordinate a boundary sharing issue in a timely manner

	AF Average	GMCCs	OCCs	AMCCs
% Agree	77.03%	52.63%	82.35%	85.71%
% Disagree	22.97%	47.37%	17.65%	14.29%

Part B: Item 15c: There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have telephoned another AMCC to coordinate a boundary sharing issue in a timely manner

	AF Average	GMCCs	OCCs	AMCCs
% Agree	91.67%	84.21%	92.86%	94.44%
% Disagree	8.33%	15.79%	7.14%	5.56%

Part B: Item 16a: There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have cc:Mailed another GMCC to coordinate a boundary sharing issue in a timely manner

	AF Average	GMCCs	OCCs	AMCCs
% Agree	18.18%	10.00%	18.18%	25.00%
% Disagree	81.82%	90.00%	81.82%	75.00%

Part B: Item 16b: There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have cc:Mailed another OCC to coordinate a boundary sharing issue in a timely manner

	AF Average	GMCCs	OCCs	AMCCs
% Agree	19.40%	6.25%	26.67%	24.24%
% Disagree	80.60%	93.75%	73.33%	75.76%

Part B: Item 16c: There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have cc:Mailed another AMCC to coordinate a boundary sharing issue in a timely manner

	AF Average	GMCCs	OCCs	AMCCs
% Agree	17.19%	5.88%	18.18%	23.53%
% Disagree	82.81%	94.12%	81.82%	76.47%

Part B: Item 17a: When coordinating with another GMCC, this facility receives accurate information

	AF Average	GMCCs	OCCs	AMCCs
% Agree	80.00%	82.61%	71.43%	79.41%
% Disagree	20.00%	17.39%	28.57%	20.59%

Part B: Item 17b: When coordinating with another OCC, this facility receives accurate information

	AF Average	GMCCs	OCCs	AMCCs
% Agree	62.34%	58.82%	72.22%	60.53%
% Disagree	37.66%	41.18%	27.78%	39.47%

Part B: Item 17c: When coordinating with another AMCC, this facility receives accurate information				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	88.00%	85.00%	78.57%	92.11%
% Disagree	12.00%	15.00%	21.43%	7.89%

Part B: Item 18a: When coordinating with another GMCC, this facility receives information in a timely manner				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	82.67%	83.33%	78.57%	81.82%
% Disagree	17.33%	16.67%	21.43%	18.18%

Part B: Item 18b: When coordinating with another OCC, this facility receives information in a timely manner				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	61.64%	64.71%	73.33%	56.76%
% Disagree	38.36%	35.29%	26.67%	43.24%

Part B: Item 18c: When coordinating with another AMCC, this facility receives information in a timely manner				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	88.89%	84.21%	84.62%	91.89%
% Disagree	11.11%	15.79%	15.38%	8.11%

Part B: Item 19a: Overall, this facility spends a great deal of time coordinating with another GMCC

	AF Average	GMCCs	OCCs	AMCCs
% Agree	72.73%	64.00%	78.57%	73.53%
% Disagree	27.27%	36.00%	21.43%	26.47%

Part B: Item 19b: Overall, this facility spends a great deal of time coordinating with another OCC

	AF Average	GMCCs	OCCs	AMCCs
% Agree	61.54%	42.11%	70.59%	65.79%
% Disagree	38.46%	57.89%	29.41%	34.21%

Part B: Item 19c: Overall, this facility spends a great deal of time coordinating with another AMCC

	AF Average	GMCCs	OCCs	AMCCs
% Agree	77.63%	72.73%	92.86%	73.68%
% Disagree	22.37%	27.27%	7.14%	26.32%

Part B: Item 20a: I prefer to communicate with another GMCC by cc:Mail when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	8.11%	0.00%	7.69%	14.71%
% Disagree	91.89%	100.00%	92.31%	85.29%

Part B: Item 20b: I prefer to communicate with another OCC by cc:Mail when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	10.39%	0.00%	17.65%	13.51%
% Disagree	89.61%	100.00%	82.35%	86.49%

Part B: Item 20c: I prefer to communicate with another AMCC by cc:Mail when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	9.59%	0.00%	7.69%	16.67%
% Disagree	90.41%	100.00%	92.31%	83.33%

Part B: Item 21a: I prefer to communicate with another GMCC by telephone when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	95.00%	88.46%	100.00%	97.22%
% Disagree	5.00%	11.54%	0.00%	2.78%

Part B: Item 21b: I prefer to communicate with another OCC by telephone when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	93.75%	95.00%	88.24%	94.87%
% Disagree	6.25%	5.00%	11.76%	5.13%

Part B: Item 21c: I prefer to communicate with another AMCC by telephone when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	98.70%	95.45%	100.00%	100.00%
% Disagree	1.30%	4.55%	0.00%	0.00%

Part B: Item 22a: I prefer to communicate with another GMCC by Internet (I.e., Event Ticket) when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	22.37%	26.09%	30.77%	19.44%
% Disagree	77.63%	73.91%	69.23%	80.56%

Part B: Item 22b: I prefer to communicate with another OCC by Internet (I.e., Event Ticket) when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	25.32%	26.32%	35.29%	23.08%
% Disagree	74.68%	73.68%	64.71%	76.92%

Part B: Item 22c: I prefer to communicate with another AMCC by Internet (I.e., Event Ticket) when working on a coordination event

	AF Average	GMCCs	OCCs	AMCCs
% Agree	25.33%	33.33%	30.77%	21.05%
% Disagree	74.67%	66.67%	69.23%	78.95%

Part B: Item 25a: I have received the necessary training to communicate with another GMCC when needed				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	80.25%	92.59%	71.43%	72.22%
% Disagree	19.75%	7.41%	28.57%	27.78%
Part B: Item 25b: I have received the necessary training to communicate with another OCC when needed				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	76.25%	85.00%	77.78%	68.42%
% Disagree	23.75%	15.00%	22.22%	31.58%
Part B: Item 25c: I have received the necessary training to communicate with another AMCC when needed				
	AF Average	GMCCs	OCCs	AMCCs
% Agree	79.22%	90.91%	71.43%	73.68%
% Disagree	20.78%	9.09%	28.57%	26.32%

Appendix E

Remaining Means and Standard Deviations

ITEM	Valid N	Mean	Std.Dev.
What percentage of the time do you use your Standard Operating Procedures (SOP/OPINES) to make job-related decisions?	99	40.97	39.38
How many telephone calls did you make during the past week to a GMCC?	99	34.99	69.50
How many telephone calls did you make during the past week to an OCC?	99	25.95	61.40
How many telephone calls did you make during the past week to a AMCC?	99	23.77	41.35
How many telephone calls did you receive during the past week from a GMCC?	99	27.95	63.76
How many telephone calls did you receive during the past week from an OCC?	99	25.10	50.25
How many telephone calls did you receive during the past week from a AMCC?	99	19.80	34.53
How many cc:Mails did you make during the past week to a GMCC?	99	2.39	8.82
How many cc:Mails did you make during the past week to an OCC?	99	2.37	9.23
How many cc:Mails did you make during the past week to a AMCC?	99	2.62	10.67
How many cc:Mails did you receive during the past week from a GMCC?	99	5.16	14.83
How many cc:Mails did you receive during the past week from an OCC?	99	6.31	20.55
How many cc:Mails did you receive during the past week from a AMCC?	99	6.06	21.42
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums face-to-face?	99	1.11	10.08
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums telephone?	99	80.03	37.15
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums cc:Mail?	99	0.49	1.66
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums Internet?	99	0.36	1.73
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums FAX?	99	0.97	2.41
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums--Meetings (more than 2 people)?	99	0.21	1.15
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums Video conferencing?	99	0.09	0.90
When you coordinate with OCCs, what percentage of the time do you use the following communication mediums teleconferencing?	99	1.03	5.52
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums face-to-face?	99	7.47	25.39
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums telephone?	99	65.17	45.99
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums cc:Mail?	99	0.89	4.23
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums Internet?	99	0.13	0.99
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums FAX?	99	0.68	1.92
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums Meetings (more than 2 people)?	99	0.10	0.91

ITEM	Valid N	Mean	Std.Dev.
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums--Video conferencing?	99	0.09	0.90
When you coordinate with GMCCs, what percentage of the time do you use the following communication mediums--teleconferencing?	99	0.54	2.50
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--face-to-face?	99	7.70	22.88
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--telephone?	99	67.69	43.57
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--cc:Mail?	99	1.23	3.58
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--Internet?	99	0.24	1.43
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--FAX?	99	0.82	2.14
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--Meetings (more than 2 people)?	99	0.31	2.20
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--Video conferencing?	99	0.09	0.90
When you coordinate with AMCCs, what percentage of the time do you use the following communication mediums--teleconferencing?	99	0.33	2.21
When you coordinate with OCCs, what percentage of the time do you coordinate with the following personnel--Field Technician?	99	15.65	28.06
When you coordinate with OCCs, what percentage of the time do you coordinate with the following personnel--OCC Specialist?	99	51.12	45.04
When you coordinate with OCCs, what percentage of the time do you coordinate with the following personnel--AMCC Specialist?	99	8.09	19.87
When you coordinate with OCCs, what percentage of the time do you coordinate with the following personnel--GMCC Specialist?	99	5.25	17.28
When you coordinate with AMCCs, what percentage of the time do you coordinate with the following personnel--Field Technician?	99	16.23	29.43
When you coordinate with AMCCs, what percentage of the time do you coordinate with the following personnel--OCC Specialist?	99	54.31	43.54
When you coordinate with AMCCs, what percentage of the time do you coordinate with the following personnel--AMCC Specialist?	99	4.76	15.05
When you coordinate with GMCCs, what percentage of the time do you coordinate with the following personnel--Field Technician?	99	10.41	24.02
When you coordinate with GMCCs, what percentage of the time do you coordinate with the following personnel--OCC Specialist?	99	48.14	46.05
When you coordinate with GMCCs, what percentage of the time do you coordinate with the following personnel--AMCC Specialist?	99	7.21	21.28
When you coordinate with GMCCs, what percentage of the time do you coordinate with the following personnel--GMCC Specialist?	99	6.31	21.24

ITEM	Valid N	Mean	Std.Dev.
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Facility Status Updates via Telephone	99	46.91	47.11
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Facility Status Updates via cc:Mail	99	0.18	1.15
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Weather Conditions via Telephone	99	11.84	31.30
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Weather Conditions via cc:Mail	99	0.15	1.12
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Scheduled Outages via Telephone	99	50.67	45.21
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Scheduled Outages via cc:Mail	99	0.35	1.79
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Unscheduled Outages via Telephone	99	50.19	45.35
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Unscheduled Outages via cc:Mail	99	0.13	1.05
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Flight Inspections via Telephone	99	25.11	42.24
Please provide the percent of time in which you have communicated with OCCs regarding the following events and communication mediums--Flight Inspections via cc:Mail	99	0.30	1.72
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Facility Status Updates via Telephone	99	39.43	45.93
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Facility Status Updates via cc:Mail	99	0.00	0.00
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Weather Conditions via Telephone	99	15.00	34.82
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Weather Conditions via cc:Mail	99	0.00	0.00
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Scheduled Outages via Telephone	99	43.29	45.33

ITEM	Valid N	Mean	Std.Dev.
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Scheduled Outages via cc:Mail	99	0.15	1.12
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Unscheduled Outages via Telephone	99	42.42	45.26
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Unscheduled Outages via cc:Mail	99	0.10	1.01
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Flight Inspections via Telephone	99	23.81	41.55
Please provide the percent of time in which you have communicated with GMCCs regarding the following events and communication mediums--Flight Inspections via cc:Mail	99	0.30	1.72
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Facility Status Updates via Telephone	99	44.32	45.74
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Facility Status Updates via cc:Mail	99	0.25	1.31
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Weather Conditions via Telephone	99	15.83	35.47
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Weather Conditions via cc:Mail	99	0.10	1.01
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Scheduled Outages via Telephone	99	50.91	43.97
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Scheduled Outages via cc:Mail	99	0.40	1.85
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Unscheduled Outages via Telephone	99	48.31	45.16
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Unscheduled Outages via cc:Mail	99	0.20	1.41
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Flight Inspections via Telephone	99	22.97	40.82
Please provide the percent of time in which you have communicated with AMCCs regarding the following events and communication mediums--Flight Inspections via cc:Mail	99	0.25	1.49
There are clearly defined procedures for coordinating between this facility and another GMCC	79	4.19	1.78

ITEM	Valid N	Mean	Std.Dev.
There are clearly defined procedures for coordinating between this facility and another OCC	84	3.23	1.84
There are clearly defined procedures for coordinating between this facility and another AMCC	78	4.04	1.82
Sometimes facilities need to share specialists with another facility (e.g., for disaster response teams). Is there a general willingness to participate in the sharing of specialists between this facility and other GMCCs?	71	4.17	1.59
Sometimes facilities need to share specialists with another facility (e.g., for disaster response teams). Is there a general willingness to participate in the sharing of specialists between this facility and other OCCs?	72	3.56	1.72
Sometimes facilities need to share specialists with another facility (e.g., for disaster response teams). Is there a general willingness to participate in the sharing of specialists between this facility and other AMCCs?	69	4.14	1.59
Sometimes facilities need to share equipment with another facility to assist with field needs. Is there a general willingness to participate in the sharing of equipment between this facility and other GMCCs to assist with field needs?	71	4.38	1.50
Sometimes facilities need to share equipment with another facility to assist with field needs. Is there a general willingness to participate in the sharing of equipment between this facility and other OCCs to assist with field needs?	71	3.65	1.76
Sometimes facilities need to share equipment with another facility to assist with field needs. Is there a general willingness to participate in the sharing of equipment between this facility and other AMCCs to assist with field needs?	68	4.18	1.53
Sometimes facilities need to share spare parts with another facility to assist with field needs. Is there a general willingness to participate in the sharing of spare parts between this facility and other GMCCs to assist with field needs?	69	4.55	1.46
Sometimes facilities need to share spare parts with another facility to assist with field needs. Is there a general willingness to participate in the sharing of spare parts between this facility and other OCCs to assist with field needs?	67	3.58	1.82
Sometimes facilities need to share spare parts with another facility to assist with field needs. Is there a general willingness to participate in the sharing of spare parts between this facility and other AMCCs to assist with field needs?	67	4.34	1.58
The sharing of specialists (e.g., for disaster response teams) between this facility and another GMCC occurs often.	73	2.77	1.84
The sharing of specialists (e.g., for disaster response teams) between this facility and another OCC occurs often.	72	2.31	1.68
The sharing of specialists (e.g., for disaster response teams) between this facility and another AMCC occurs often.	72	2.65	1.70
The amount of sharing of equipment between this facility and another GMCC is adequate for coordinating a return to service.	66	4.24	1.54
The amount of sharing of equipment between this facility and another OCC is adequate for coordinating a return to service.	63	3.35	1.74
The amount of sharing of equipment between this facility and another AMCC is adequate for coordinating a return to service.	63	4.02	1.60
The amount of sharing of spare parts between this facility and another GMCC is adequate for coordinating a return to service	66	4.05	1.59

ITEM	Valid N	Mean	Std.Dev.
The amount of sharing of spare parts between this facility and another OCC is adequate for coordinating a return to service	63	3.40	1.69
The amount of sharing of spare parts between this facility and another AMCC is adequate for coordinating a return to service	62	3.90	1.63
The amount of communications between this facility and other GMCC is adequate for the completion of coordinating efforts between the two facilities	77	4.84	1.37
The amount of communications between this facility and other OCC is adequate for the completion of coordinating efforts between the two facilities	79	3.84	1.82
The amount of communications between this facility and other AMCC is adequate for the completion of coordinating efforts between the two facilities	75	4.72	1.33
We work as a team whenever there are coordination events between this facility and other GMCCs	74	4.88	1.31
We work as a team whenever there are coordination events between this facility and other OCCs	80	3.89	1.79
We work as a team whenever there are coordination events between this facility and other AMCCs	73	4.96	1.25
I have communicated in a timely manner with another GMCC about coordinating a return to service event	76	5.24	1.15
I have communicated in a timely manner with another OCC about coordinating a return to service event	80	4.85	1.58
I have communicated in a timely manner with another AMCC about coordinating a return to service event	75	5.25	1.22
The teamwork within this facility is adequate for the completion of coordinating efforts between this facility and other GMCCs	76	5.03	1.22
The teamwork within this facility is adequate for the completion of coordinating efforts between this facility and other OCCs	76	4.43	1.57
The teamwork within this facility is adequate for the completion of coordinating efforts between this facility and other AMCCs	72	5.14	1.05
Overall, the coordination between this facility and other GMCCs is adequate	76	4.72	1.39
Overall, the coordination between this facility and other OCCs is adequate	77	3.92	1.80
Overall, the coordination between this facility and other AMCCs is adequate	75	4.89	1.21
Coordination response times between this facility and other GMCCs are adequate	75	4.60	1.46
Coordination response times between this facility and other OCCs are adequate	74	3.78	1.73
Coordination response times between this facility and other AMCCs are adequate	74	4.55	1.41
Coordination procedures are well established between this facility and other GMCCs	77	4.16	1.69
Coordination procedures are well established between this facility and other OCCs	77	3.25	1.73
Coordination procedures are well established between this facility and other AMCCs	75	4.25	1.63
There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have telephoned another GMCC to coordinate a boundary sharing issue in a timely manner	74	4.97	1.22
There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have telephoned another OCC to coordinate a boundary sharing issue in a timely manner	74	4.36	1.63

ITEM	Valid N	Mean	Std.Dev.
There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have telephoned another AMCC to coordinate a boundary sharing issue in a timely manner	72	4.92	1.26
There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have cc:Mailed another GMCC to coordinate a boundary sharing issue in a timely manner	66	2.08	1.50
There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have cc:Mailed another OCC to coordinate a boundary sharing issue in a timely manner	67	2.06	1.48
There are occurrences when one facility's area of coverage will overlap with another facility's area of coverage. I have cc:Mailed another AMCC to coordinate a boundary sharing issue in a timely manner	64	2.06	1.46
When coordinating with another GMCC, this facility receives accurate information	75	4.60	1.44
When coordinating with another OCC, this facility receives accurate information	77	3.78	1.75
When coordinating with another AMCC, this facility receives accurate information	75	4.67	1.34
When coordinating with another GMCC, this facility receives information in a timely manner	75	4.55	1.45
When coordinating with another OCC, this facility receives information in a timely manner	73	3.67	1.69
When coordinating with another AMCC, this facility receives information in a timely manner	72	4.65	1.34
Overall, this facility spends a great deal of time coordinating with other GMCCs	77	4.17	1.58
Overall, this facility spends a great deal of time coordinating with other OCCs	78	3.76	1.77
Overall, this facility spends a great deal of time coordinating with other AMCCs	76	4.38	1.52
I prefer to communicate with another GMCC by cc:Mail when working on a coordination event	74	1.55	1.07
I prefer to communicate with another OCC by cc:Mail when working on a coordination event	77	1.65	1.27
I prefer to communicate with another AMCC by cc:Mail when working on a coordination event	73	1.60	1.11
I prefer to communicate with another GMCC by telephone when working on a coordination event	80	5.50	1.09
I prefer to communicate with another OCC by telephone when working on a coordination event	80	5.44	1.20
I prefer to communicate with another AMCC by telephone when working on a coordination event	77	5.64	0.78
I prefer to communicate with another GMCC by intranet (i.e., Event Ticket) when working on a coordination event	76	2.05	1.44
I prefer to communicate with another OCC by intranet (i.e., Event Ticket) when working on a coordination event	79	2.22	1.60
I prefer to communicate with another AMCC by intranet (i.e., Event Ticket) when working on a coordination event	75	2.23	1.53

ITEM	Valid N	Mean	Std.Dev.
We all try to assist with any coordination efforts that may occur between this facility and other GMCCs	79	5.14	1.24
We all try to assist with any coordination efforts that may occur between this facility and other OCCs	79	4.81	1.62
We all try to assist with any coordination efforts that may occur between this facility and other AMCCs	75	5.24	1.05
I have the necessary tools (i.e., telephone, computer, software) to communicate with another GMCC when needed	78	4.56	1.61
I have the necessary tools (i.e., telephone, computer, software) to communicate with another OCC when needed	81	4.41	1.70
I have the necessary tools (i.e., telephone, computer, software) to communicate with another AMCC when needed	76	4.58	1.60
I have received the necessary training to communicate with another GMCC when needed	81	4.54	1.61
I have received the necessary training to communicate with another OCC when needed	80	4.30	1.73
I have received the necessary training to communicate with another AMCC when needed	77	4.43	1.61
When communicating with another GMCC, I have enough time to fully coordinate the current task	79	3.95	1.71
When communicating with another OCC, I have enough time to fully coordinate the current task	81	3.72	1.79
When communicating with another AMCC, I have enough time to fully coordinate the current task	78	4.03	1.60

Appendix F

Specialists' Comments Regarding SOP Use

SOP Comments: "Do you think that the SOP for your position is a good resource for making job-related decisions? Why or why not?"

1. NO COMMENT
2. I FEEL LIKE WE NEED SOME STANDARDIZATION IN OUR FAA ORGANIZATION; WE NEED STANDARD SOPS; WE NEED STANDARDIZED SOP POSITIONS AS WELL; THE NOM & NAS DO THE SAME WORK, SO WE NEED THE SAME PAYBAND! STANDARDIZED MEANS ALL THE SAME! I HAVE THE SAME TRAINING AND THE SAME CERTIFICATION AS NOMS
3. BECAUSE THE AOCC DOES NOT SEEM TO BE FAMILIAR WITH THE OPINES, EVEN THOUGH THEY ARE THE REASON WE USE THEM
4. NO COMMENT
5. OFTEN SITUATIONS ARE VARIED AND MANY TIMES REQUIRE DIFFERENT APPROACHES TO SOLVE TROUBLES
6. HELPS IN HANDLING FACILITY OUTAGES
7. IN THE GMCC WE HAVE BEEN OPERATING AS A VERY FUNCTIONAL & FLUID UNIT; USING THE OPINES BECOMES CUMBERSOME & HAMPERS THE JOB
8. NO CONFUSIONS; INSURES EVERYTHING'S DONE UNIFORMLY
9. IT SETS A JOB STANDARD
10. UNCLEAR AND TOO SIMPLISTIC; LOGICAL/CRITICAL THINKING COMES FROM PAST EXPERIENCE AND NON-TECHNICAL DECISION MAKING RARELY WORKS WITH A FLOW-CHART APPROACH
11. OUT OF DATE; KNOWLEDGE TO MAKE GOOD DECISIONS WAS OBTAINED PRIOR TO WORKING AT GMCC
12. NO COMMENT
13. MORE EXPOSURE
14. SOURCE OF INFORMATION NOT COMMITTED TO MEMORY; PREVENTS ERRORS
15. NO COMMENT

16. NO COMMENT
17. THE SOPS ARE WELL DOCUMENTED AND ADDRESS ALMOST ALL SITUATIONS ENCOUNTERED BUT WOULD BE MUCH MORE BENEFICIAL IF THE FIELD WOULD ADHERE TO USING THE SOPS
18. NO COMMENT
19. THERE IS NO COOK BOOK FOR MAKING RATIONAL, LOGICAL DECISIONS
20. NO COMMENT
21. NO COMMENT
22. COORDINATION IS BUT A PART OF THE JOB. MY JOB IS TO PROVIDE AIR TRAFFIC ALL THE TOOLS REQUIRED TO DO THEIR JOB (AUTOMATION, RADAR, AND NAVAIDS)
23. PROCESSES/PROCEDURES REQUIRE LITTLE DECISION MAKING; THEY ARE TASKS; NON-REPETITIVE AND UNUSUAL EVENTS NOT COVERED IN THE SOPS ARE WHAT REQUIRE JOB-RELATED DECISIONS
24. NO COMMENT
25. WHAT DO YOU CONSIDER STANDARD OPERATING PROCEDURES???
26. EVERY SITUATION IS DIFFERENT & THE SOPS DO NOT COVER THEM OR PROVIDE THE NEEDED GUIDANCE. NO ONE USES THE SOPS UNLESS THERE IS A DISPUTE OVER A PROCEDURE-THE SOP RESOLVES THE DISPUTE
27. THIS JOB IS SO COMPLEX THAT IT COULD NOT BE COMPLETELY COVERED IN AN SOP. I STILL EXPERIENCE NEW SITUATIONS THAT REQUIRE DECISIONS ON MY PART AFTER XXXXXXXX YEARS AS A NOM/NAS. THE CRITICALITY OF TIMELY DECISION MAKING REQUIRES AN IN-DEPTH KNOWLEDGE OF ALL OUR SYSTEMS AND SPECIAL SITUATIONS WHICH CAN NOT BE COVERED IN AN SOP
28. NO COMMENT
29. NO COMMENT
30. THEY DON'T HAVE THE OPINES OUT TO US
31. GOOD STEP BY STEP PROCEDURES FOR THOSE WHO CANT THINK. IT CAN'T POSSIBLY COVER EVERY SITUATION SO IT'S NO SUBSTITUTE FOR EXPERIENCE OR COMMON SENSE
32. TOO MANY DIFFERENT SITUATIONS THAT DO NOT MEET OUR WRITTEN CRITERIA

33. NO COMMENT
34. WITHOUT GUIDELINES OR RULES YOU HAVE CHAOS
35. SOP ARE POORLY WRITTEN
36. THE SOP DOESN'T SEEM TO BE WRITTEN BY ANYONE THAT HAS EVER HAD EXPERIENCE WORKING THE JOB
37. NEED SOME STARTING POINT; THEY ARE NOT SPECIFIC-ONLY BROAD BASED, LARGE BRUSH STROKES; MANY SITUATIONS DETERMINED BY WX-ATC REQUEST; TRAFFIC LOAD, AREA, GEOGRAPHIC, POLITICAL
38. GOOD BASIS FOR INFO, NORMALLY
39. TEAM LEAD
40. TOO AMBIGUOUS
41. DON'T THINK THAT WE HAVE A SOP OPEN AT OUR ELBOW. MOSTLY WE GO FROM MEMORY, CONVENTION, PERSONAL CHOICE WHEN AMBIGUITIES OCCUR WHICH THEY DO WITH REGULARITY
42. NO COMMENT
43. SOP ARE A GREAT START BUT MORE WRITTEN GUIDELINES NEED TO BE DEVELOPED
44. NO COMMENT
45. NO COMMENT
46. THEY LACK IN INFORMATION AND STANDARDIZATION
47. I JUST STARTED HERE
48. NO COMMENT
49. IT IS A GOOD RESOURCE IF YOU HAVE ANY QUESTIONS REGARDING A TYPE OF OUTAGE
50. COMMON SENSE
51. NO COMMENT
52. SOP DATA DOES NOT APPLY TO FAILED TELCO CIRCUITS, BAD WEATHER, INTERMITTENT LOSSES OF COMMUNICATIONS DUE TO SOFTWARE HITS ON THE VSCS. NOR DO SOPS AID IN DETERMINING THE CAUSES OF BEACON SPLITS AND FALSE TARGETS
53. A LOT OF THE FIELD FACILITIES DO NOT FOLLOW THE OPINES

54. IT GIVES A GOOD STARTING POINT. SINCE NOT ALL FACILITIES WE DEAL WITH HAVE NOT TRANSITIONED UNDER THE OCC, WE STILL GO OUTSIDE THE OPINES TO WORK ISSUES
55. TOO VAGUE
56. WE HAVE SEVERAL SOPS. WHICH ONE YOU ARE INTERESTED IN, I DON'T KNOW? SOPS DO NOT ALWAYS AGREE WITH FAA ORDERS. I WOULD LIKE TO SEE SOPS DISCONTINUED
57. THE SOP DOES NOT ADDRESS REAL LIFE ISSUES. NOT EASY TO UPDATE. IN THE HEAT OF THE BATTLE YOU DON'T TAKE TIME TO READ THE RULE BOOK. SOP CAN HINDER, EFFECTIVELY CONTROL THE SITUATION
58. NO COMMENT
59. SOPS ARE DESIGNED FOR SPECIFIC PROBLEMS, AND MOST OF THE TIME PROBLEMS DON'T FIT INTO A NEAT LITTLE STEP-BY-STEP SOLUTION. SOPS ARE FINE FOR SCHEDULING OUTAGES OR MAINTENANCE ACTIVITIES, BUT SERVE LITTLE OR NO PURPOSE IN UNSCHEDULED ACTIVITIES
60. IT HAS THE OCC DOING FUNCTIONS THEY ARE NOT TRAINED FOR- WITHOUT PROPER RESOURCES AND THE RESOLVE TO CLEAR PROBLEMS IN SOCS' AIRSPACE
61. EVERY DAY GUIDANCE IN AN OPERATIONAL CONTROL WORK ENVIRONMENT
62. TOO MANY MIDDLE MEN
63. PROCEDURES IN OPINES HAD TO BE MODIFIED FOR OUR TRANSITION
64. SOPS DO NOT ENCOMPASS ALL POTENTIAL SITUATIONS OR ALLOW FOR SPECIFIC FACILITY/CUSTOMER NEEDS/DIFFERENCES. GENERALIZED GUIDELINES ARE FINE, NAS/NOMS NEED LATITUDE TO DEVIATE AS THEY FEEL APPROPRIATE WITH REGARD TO SITUATION/INCIDENT
65. TOO MANY EXCEPTIONS
66. ACCORDING TO OUR DIRECTION, THE OPINES HAVE NOT BEEN IMPLEMENTED. IMPLEMENTATION OF OPINES REQUIRES NEGOTIATIONS THAT WERE NOT COMPLETED. THE ENTIRE OCC CONCEPT IS A BAD IDEA BROUGHT ON ONLY BY POLITICAL CONSIDERATIONS AND NO CONSIDERATION FOR EFFECTIVE, SAFE, AND EFFICIENT OPERATIONS OF THE NAS
67. TOO MANY "LIVE" DECISIONS AND "LIVE" SYSTEM OPERATIONS

68. BASED ON MY EXPERIENCE, DOING THIS JOB HAS GIVEN ME MORE INSITE ON WHAT TO DO, THAN THE RIGID PROCEDURES OUTLINED IN THE OPINES
69. NO COMMENT
70. WHEN COMMON SENSE FAILS TO APPLY, THERE IS ALWAYS THE SOP TO FALL BACK ON
71. NO COMMENT
72. HAVEN'T SEEN IT (THEY MAY BE SECRET!)
73. NO COMMENT
74. NO COMMENT
75. NO COMMENT
76. USE REDBOOK PROCEDURES AND XXXXXX ARTCC SOPS OFTEN
77. NO COMMENT
78. NO COMMENT
79. NO COMMENT
80. NEED STANDARD RESPONSES FOR COMMON UNDERSTANDING AT ALL LEVELS TO PROCESS NAS PROBLEMS EFFICIENTLY AND IN A TIMELY MANNER
81. BASIC GUIDELINE TO WHAT NEEDS TO BE DONE
82. DECISIONS MUST BE MADE IMMEDIATELY. THERE IS NO TIME TO LOOK UP IN THE SOP UNTIL AFTER THE DECISION IS MADE
83. IT STANDARDIZES OPERATIONS AND MAKES THE PLAYING FIELD LEVEL FOR ALL
84. NO COMMENT
85. COVERS MOST DECISIONS
86. SAVES ON MY MEMORY SPACE (IN MY HEAD)
87. HELPED WRITE OPINES
88. TOO VAGUE
89. MOST OF THE TIME

90. IT WILL TAKE TIME TO ADAPT THAT WAY OF "THINKING" TO ME
91. HINT: THIS IS NOT EXACTLY A YES OR NO QUESTION, YOU KNOW! THE SOPS ARE GOOD FOR STANDARDIZATION AND AN EXCELLENT TRAINING TOOL. IN DAY-TO-DAY WORK, I SELDOM OPEN THEM UP, BUT I FIND THAT HOW I WORK FOLLOWS THEM PRETTY CLOSE MOST OF THE TIME. THEY ARE BETTER USED AS GUIDELINES THAN AS COOKBOOKS. IN REALITY, A LOT OF SITUATIONS OR SPECIFICS AREN'T COVERED BY CUT AND DRY PROCEDURES
92. QUANTITY OF SITE SPECIFIC CIRCUMSTANCES
93. THE SOP APPEARS TO HAVE BEEN WRITTEN BY PEOPLE WHO DO NOT DO THE WORK, OR WHO ARE NOT ACCOUNTABLE FOR THE RESULTS OF THE WORK
94. THERE IS NO SOP FOR THE COMBINED (GMCC CENTER MCC). ALSO, ALASKA HAS SOME UNIQUE AREAS THAT SOPS DO NOT ADDRESS. WHEN WE TRANSITION TO THE POCC/SCC MANY OF THESE HAVE NOT BEEN CONSIDERED
95. IT WILL HELP THE LESS EXPERIENCED AND PROVIDE SOME HELP TO THOSE WITH A LOT OF EXPERIENCE
96. MY JOB RELATED DECISIONS ARE MADE FROM PAST XX YEARS WORK EXPERIENCE, KNOWLEDGE OF EQUIPMENT, NAS AND CERTIFICATIONS
97. TO SOME EXTENT, OPINES DON'T COVER EVERYTHING THAT CAN COME UP. IT DOES COVER THE BASIC ROUTINE STUFF
98. NO COMMENT
99. NO COMMENT

Appendix G

Specialists' Comments Regarding Their Final Comments

Additional Comments: "Based on your responses above, please provide any comments that you wish to add to justify your responses".

1. I WORK IN A GMCC AND ALL COORDINATION AND COMMUNICATION IS WITH TECHS AND ATC. IF A PROBLEM CAUSES IMPACT THIS UNIT DEALS DIRECTLY WITH THE NOCC. OPINES, ETC., ARE PROCEDURES THAT REALLY DON'T APPLY TO US YET. THEY ARE SIMILAR TO SOPS WE'VE FOLLOWED FOR YEARS, EXCEPT WE'VE HAD LITTLE CONTACT WITH MOCC (OCCS) TO DATE
2. NO COMMENT
3. WHEN THE AOCC CAME, PEOPLE WERE NOT FAMILIAR WITH THE OPINES AND DID NOT HAVE A CLUE AS TO WHAT COORDINATION THE ARTCCS DID. AS OF 11/11/01 IT HAS NOT IMPROVED. AT THE XXXXXXXX SOC WE STILL HAVE NOT BEEN BRIEFED ON THE FINAL OPINES, IF IT EXISTS
4. NO COMMENT
5. NO COMMENT
6. NO COMMENT
7. WHEN CHECKING THE SOC, I WAS USING THE XXXXXXXX AMCC AS THEY ARE IN THE PROCESS OF BEING A SOC-WHEN INTERFACING WITH THE OCC, I HAVE BEEN VERY DISSATISFIED, THEY SEEM VERY UNINFORMED, AND WE ALWAYS HAVE TO FOLLOW UP WITH THEM-THEY NEVER CALL US!
8. WILL NOT BE ACCURATE ASSESSMENT; I'VE NOT DEALT WITH SOCS OR OCCS; 2 DEALINGS WITH MOCC WITH UNFAVORABLE RESULTS
9. THIS QUESTIONNAIRE DOES NOT MATCH THE JOB WE HAVE HERE IN THE XXXXXXXX GMCC (XXXXXXXXSMO). THERE'S NO SOCS OR OCCS AS OF YET. WE DEAL WITH FIRST LINE SSCS (21 EACH) AND OTHER GMCC OR AMCCS. WE HAVE 3400 PLUS FACILITIES AND SERVICES SO WE HAVE BEEN DOING AN OCC JOB FOR ABOUT 9 YEARS. HERE IS A ROUGH RULE OF THUMB "FOR EVERY OUTAGE WHETHER A FACILITY OR SERVICE THERE ARE EIGHT (8) PHONE CALLS AT A MINIMUM". EXAMPLE: THIS EVENING I GOT A CALL FROM THE AIR TRAFFIC PERSONNEL AT XXXXXXXX ARTCC. A NON-FED NDB WAS REPORTED OUT OF SERVICE BY MILITARY AIRCRAFT. I MADE 6 PHONE CALLS PLUS INTERNET WORK TO GET THE CONTRACTORS NAME AND PHONE # AND TO ADVISE THE MANAGER WHOSE SSC IT WAS LOCATED AND THE AIR TRAFFIC PERSONNEL AT THE CENTER THAT THE PROBLEM WAS BEING DEALT WITH NOW. VERY TIME INTENSIVE

10. AS I ANSWERED THESE IT BECAME APPARENT MOST OF THESE QUESTIONS ARE NOT RELEVANT!!! AS A TECH I COORDINATE ALL ACTIONS WITH OUR MCC/SOC. THE REAL ISSUE IS, GOING THROUGH THE OCC (AS OPPOSED TO DIRECT WORKCENTER TO TELCO) FOR TELCO SERVICES IS A HINDRANCE. THE PROCESS DOES NOT WORK AND ULTIMATELY THE WC TECH HAS TO SPEAK DIRECTLY WITH TELCO ANYWAY. COMPLETION OF MAINTENANCE ACTIONS IS DRAMATICALLY SLOWED. COORDINATION WITH OTHER FAA FACILITIES (ALSO VIA SOC/MCC) IS OFTEN SLOW ALSO, OFTEN NOT ADEQUATELY TRACKED FOR TASKINGS AND 'FIELD' FACILITIES SLOW TO RESPOND TO ARTCC REQUESTS. TELEPHONE COMM. IS BEST FOR COORDINATING ALMOST ALL OUTAGES/RESTORAL ACTIONS/TESTING ETC. EMAIL IS GREAT FOR LONG-LEAD ITEMS, PROJECT COORDINATION AND CASES WHERE A 'HISTORY' MUST BE MAINTAINED. PROBLEMS EXIST IN TRACKING/COORDINATING EFFORTS BECAUSE MULTIPLE (UNRELATED) DESIGNATIONS FOR A SINGLE COMMUNICATIONS CIRCUIT. WHEN MORE THAN ONE FACILITY IS INVOLVED...FOLLOW UP ACTIONS ARE NOT ADEQUATELY TRACKED AND ARE OFTEN NOT AGGRESSIVELY PURSUED. THE SYSTEM DOES NOT FACILITATE FOLLOW-UP AND THIS BECOMES A FUNCTION OF INDIVIDUAL INITIATIVE. EXAMPLE/AN ANALOGY: TELCO/MCI ISSUES A SINGLE 'TICKET NUMBER' TO TRACK AN OUTAGE REGARDLESS OF WHAT SUBCONTRACTOR OR FAA FACILITY IS INVOLVED. THEY ALSO USE A SINGLE CIRCUIT ID. FAA USES DIFFERENT NAMES FOR CIRCUIT AT EACH END, AND NO COMMON JOB CONTROL # OR TICKET# IS USED FOR REFERENCE ON FOLLOW UPS ETC. A CURRENT PROBLEM ON BANDWIDTH MANAGER (FAA OWNED) EFFECTED SERVICES IN MULTIPLE LOCATIONS...NOBODY WAS NOTIFIED, TIME WASTED IN TROUBLESHOOTING, NO COMMON JOB # TO REFERENCE FOR ALL EFFECTED FACILITIES...RESULT = CONFUSION, WASTED EFFORT TROUBLESHOOTING, AND SLOWER RESPONSE FOR RESTORAL OF SERVICES
11. NO COMMENT
12. #24; GMCC; TRAINING IN COMPUTER SOFTWARE IS INADEQUATE. WE HAVE EVENT TICKETING & HAD A RUSH 3-DAY CLASS TO INTRODUCE US TO IT. NEED A MUCH LONGER CLASS TO LEARN ALL THE CAPABILITIES FROM TEACHERS LIKE AT THE ACADEMY. WORK TRAINING IN THIS AREA WAS NOT WELL THOUGHT OUT
13. NO COMMENT
14. NO COMMENT
15. NO COMMENT
16. NO COMMENT
17. PRESENTLY BECAUSE OF A LACK OF EMPLOYEE ASSIGNED TO THE OCC HAS CAUSED A PROBLEM IN COMPLETING THE REQUIRED TRAINING COURSES AND THE ABILITY TO TRAIN NEW OCC SPECIALIST ON THE JOB

18. NO COMMENT
19. 26-DEALING WITH OCCS IS HAMPERED BY THE LACK OF EXPERIENCE AND KNOWLEDGE AT OCCS
20. MUCH OF THIS QUESTIONNAIRE DOES NOT APPLY TO MY UNIT, AS WE, BY PROCEDURE, DO NOT HAVE OCC CONTACT. WE ALL UNDERSTAND THAT THE PROCESS WILL EVOLVE. THANKS
21. ANOTHER BULLSHIT QUESTIONNAIRE; SAVE MY TAX 'DALLARS'!
22. THIS IS THE HOLIDAY SEASON. ALL ANSWERS ARE SKEWED. #11 = WE HAVE NOT TRANSITIONED TO THE OCC SO WE COORDINATE ONLY WITH FACILITIES IN THERE CONTROL. ALL COORDINATION DONE BY PHONE; # 8 - 10 = DOES NOT INCLUDE APCH CONTROL OR AFSS
23. NO COMMENT
24. NO COMMENT
25. OCCS ARE JUST ANOTHER LEVEL OF OUR GOVERNMENTS FAMED BUREAUCRACY
26. WE SPEND 90% OF OUR TIME COORDINATING WITH FIELD TECHNICIANS WHO DO THE WORK-NOT OTHER EMPIRES!
27. THE OCC SEEMS TO BE MORE CONCERNED ABOUT WHO HAS CONTROL OF A FACILITY THAN MAKING SURE ALL COORDINATION HAS BEEN COMPLETED
28. NO COMMENT
29. NO COMMENT
30. NO COMMENT
31. NO COMMENT
32. MCS (MONITORING AND CONTROL SUBSYSTEM) DOES NOT WORK AS IT SHOULD. THEY CAUSE SO MANY FALSE ALARMS THAT AN AUDIO ALARM CANNOT BE USED! IT HAS TAKEN UP TO 40 MINUTES TO UPDATE A SUBSYSTEM SCREEN!
33. NO COMMENT
34. NO COMMENT
35. NO COMMENT

36. THE ONLY TOOL THAT ALLOWS IMMEDIATE BACK AND FORTH COMMUNICATION OF AN EVENT IS THE TELEPHONE; OCCS DUE TO MANY REASONS (UNDERSTAFFING, INEXPERIENCE, LACK OF WRITTEN DIRECTION SUCH AS MOA, MOU, SOP, ETC) ARE AN IMPEDIMENT TO EASY, QUICK AND ACCURATE COORDINATION
37. NO TELEPHONE SPEED DIAL; HAVE 44 "HOT BUTTONS", ONLY USE ABOUT 4 OF THEM. SO, WE MUST MANUALLY DIAL ALL 12 DIGITS OF TELEPHONE #; INTRANET CONNECTION SLOW-UNBELIEVABLE; REMOTE MONITORING-MASS-VERY POOR FOR OCC USE
38. TBA
39. I DO NOT HAVE TIME TO COMMUNICATE WITH THE OTHER TWO (LITTLE) OCCS. NO TEAM WORK BETWEEN THE OCCS. WE HANDLE OUR AIRSPACE AND I LET THE OTHERS DO THE SAME
40. NO COMMENT
41. #26; INADEQUATE STAFFING FORCES SOME DELAY AND A LOT OF PRIORITY SETTING, ESPECIALLY DURING A DAY SHIFT
42. NO COMMENT
43. ITEM # 2, 3, 4, 5, 6, 7-WE HAVE NOT DONE ANY OF THIS YET BUT WOULD BE ABLE TO HELP THE SOC NEXT DOOR
44. THE QUESTIONS NOT ANSWERED WERE N/A OR I DIDN'T UNDERSTAND THEM
45. NO COMMENT
46. NO COMMENT
47. I AM SORRY I DON'T FEEL THAT I HAVE THE KNOWLEDGE OR BACKGROUND TO COMPLETE THIS SURVEY TO BE OF ANY HELP TO YOU
48. THE OCC CONCEPT OVERALL IS A GOOD IDEA. HOWEVER, REALITY DICTATES THAT IT IS A WASTE OF GOVERNMENT TIME, RESOURCES AND MONEY. ABANDON THE CONCEPT AND RESTAFF THE SOCS
49. NO COMMENT
50. NO COMMENT
51. NO COMMENT

52. ITEM 25; THE ONLY TRAINING PROVIDED BY THE AGENCY IS THE EVENT MANAGER SOFTWARE CONDUCTED AT HERNDON, VA. ITEM 26; REGARDING ADEQUATE TIME FOR FULL COMMUNICATIONS, IT REALLY DEPENDS ON STAFFING AND THE CIRCUMSTANCES (I.E., OTHER PHONE CALLS (INCOMING) AND EQUIPMENT FAILURES)
53. NO COMMENT
54. ITEMS 1-7; FACILITY TYPE OCC, SOC, GMCC-WE DO NOT HAVE SPARES TO SHARE. ITEM 26; FACILITY GMCC, OCC, GMCC-NOT ENOUGH STAFFING TO HAVE ENOUGH
55. 2, 3, 4, 6, 7; NO OCCURANCES YET. 11; NOT CLEAR. 13 & 18; BASED ON AIR TRAFFIC APPROVALS
56. I AM AT AN OCC AND MOST OF THESE QUESTIONS DO NOT APPLY. THEY ARE WRITTEN MOSTLY FOR FIELD PEOPLE OUTSIDE OCC. CRITICAL NEEDS AT MOCC: SOFTWARE UPGRADES, TRAINING, STAFFING
57. SHOULD NEVER USE CCMail FOR OFFICIAL NOTIFICATION. THIS IS VERY POORLY WRITTEN QUESTIONNAIRE. WHAT IS A DISASTER RESPONSE TEAM? COME OUT TO THE OCCS FOR FIRST HAND EXPERIENCE
58. NO COMMENT
59. 2, 3, 4; WE HAVE OCCASIONALLY LOANED SPARE PARTS TO OTHER ARTCCS, BUT I DON'T RECALL EVER SHARING EQUIPMENT OR MANPOWER WITH ANOTHER CENTER. GENERAL-SO FAR, THE OCCS HAVE BEEN MORE OF A HINDRANCE THAN A HELP BECAUSE THEY ADD A LAYER OF BEAUROCRACY INTO THE COORDINATION EFFORT
60. YOU HAVE PLACED THE OCC BETWEEN THE GNAS AND CENTERS GIVING THEM THE RESPONSIBILITY OF COMLINE/RCAGS. NO RESOURCES TO CHECK THEM. IN OTHER WORDS, YOU HAVE ADDED ONE MORE STEP IN THE SOCS ABILITY TO CORRECT PROBLEMS AND MAINTAIN THE NAS!
61. NO COMMENT
62. #8; THE OCCS ARE JUST ANOTHER MIDDLE MAN AS FAR AS CALL OUTS AND SCHEDULING OUTAGES. A TECH AT THE ARTCC SHOULD BE ABLE TO DIRECTLY CALL AN SFO IF A TECH IS NEEDED. INSTEAD, HE CALLS THE AMCC, WHICH CALLS THE OCC, WHICH CALLS THE SFO. THIS JUST CREATES MORE PAPERWORK AND INCREASES THE CHANCE FOR MIS-COMMUNICATION AND CREATES DELAYS FOR EQUIPMENT REPAIR
63. GOOD LUCK!
64. NO COMMENT
65. NO COMMENT

66. THERE WAS NO COORDINATION OR NEGOTIATIONS COMPLETED BEFORE WE TRANSITIONED TO A SOC. IT WAS THRUST UPON US WITH TWO DAYS NOTICE BASED ON A LETTER PUT OUT BY AOP-XXXXXXX XXXXXXXX DATED NOVEMBER 26. DATABASES WERE HOPELESSLY OUT OF DATE AND ARE STILL INCOMPLETE. THE COORDINATION NOW REQUIRED HAS GONE FROM THREE STEPS TO 9 IN SOME INSTANCES. THIS ENTIRE CONCEPT IS NOT READY, EITHER TECHNOLOGICALLY OR PRACTICALLY. EQUIPMENT (I.E., RELIABLE INTERNET CONNECTION) IS NOT READY. THE NIMS PLATFORM DOES NOT WORK. THERE IS ABSOLUTELY NO "BANG FOR THE BUCK" IN THIS PLAN. IT IS MORE WORK AND LESS EFFICIENT
67. IT IS OBVIOUS THAT HQ DOESN'T HAVE THE FOGGIEST IDEA BETWEEN GNAS AND ARTCCS. THIS IS A WASTE OF TIME AND MONEY! THE OCC CONCEPT MUST BE SOME HIGH POLITICAL AWARD TO MAKE IT WORK- NO MATTER WHAT! THIS IS FRAUD, WASTE AND ABUSE OF TAXPAYERS MONIES
68. I HOPE YOU GOT THE QUESTIONS WRITTEN CORRECTLY SO THE OCC CONCEPT WILL BE ACCEPTED BY ALL IN THE FAA
69. NO COMMENT
70. NO COMMENT
71. CURRENTLY OUR OPERATION IS COMBINED GNAS/CENTER. THIS OPERATION IS TOO BIG. GNAS NEEDS TO BE SEPARATE. CENTER OPERATIONS NEED TO BE SEPARATE. JUST WANT TO LET YOU KNOW, I HAVE SENT YOU THE PREVIOUS SURVEY. I WAS TOLD THAT YOU DID NOT RECEIVE IT
72. LAST MINUTE SHUT DOWN REQUESTS-OCC IS STAFFED WITH PERSONNEL WHO DON'T KNOW WHAT AN RCL IS-WHAT AN RCO IS, WHAT A IS (FILL IN THE BLANK YOURSELF).
73. THE OCCS HAVE CREATED ANOTHER LAYER OF BUREAUCRACY THAT SLOWS DOWN RESPONSE TIMES AND DELAYS INFO IN TIMELY MANNER. SOMETIMES TAKES 30 MINUTES OR MORE TO RECEIVE RTS OF FACILITIES THROUGH OCCS. MONEY NOT WELL SPENT!
74. NO COMMENT
75. NO COMMENT
76. NO COMMENT
77. THIS QUESTIONNAIRE SEEMS TO BE PREMATURE SINCE WE HAVE NOT TRANSITIONED OUR GMCC TO THE OCC. A MORE ACCURATE SURVEY WOULD BE ATTAINED ABOUT 6 MONTHS TO A YEAR FROM NOW.
78. NO COMMENT

79. NO COMMENT
80. WE ARE IN EARLY STAGES OF IMPLEMENTATION AND THESE ANSWERS INVOLVE A LOT OF GUESS WORK. THIS WOULD BE MORE VALID IN SIX MONTHS TO A YEAR
81. NO COMMENT
82. NO COMMENT
83. THE MOST EFFECTIVE COMMUNICATION IS BY TELEPHONE
84. OCCS ARE SLOW TO RESPOND WHEN A SERVICE RTS AND CALL THE WRONG PHONE NUMBERS WHEN TRYING TO COORDINATE AN OUTAGE
85. NO COMMENT
86. NO COMMENT
87. NO COMMENT
88. NO COMMENT
89. NO COMMENT
90. NO COMMENT
91. ALL ITEMS: RESPONSES FOR OCC INCLUDE NMCC, AS WE COORDINATE MOSTLY WITH THEM
92. NO COMMENT
93. NO COMMENT
94. NOTE: NEARLY ALL QUESTIONS DO NOT APPLY TO THE XXXXXXXX REGION MCC OPERATION. WE OPERATE AS A COMBINED MCC (GMCC AND CENTER MCC). WE CURRENTLY PROVIDE ALL MCC FUNCTIONS FOR THE STATE OF XXXXXXXX. BASICALLY WE OPERATE AS AN OCC AND SOC. SINCE WE HANDLE 100% OF THIS WORKLOAD WE DO NOT COORDINATE WITH ANY OTHER OCC/MCC/SOC. WE DO COORDINATE WITH NMCC. I HAVE READ THE SOP/OPINES FOR OUR TRANSITION TO THE POCC/SOC. THEY ARE VERY VAGUE AND WERE NOT WRITTEN FOR A COMBINED OPERATION SUCH AS OURS. WE ALSO HAVE FACILITIES AND TOPOGRAPHY THAT WILL MAKE THIS TRANSITION VERY DIFFICULT
95. MOST OF THESE QUESTIONS DO NOT FIT THE MCC PROFILE IN XXXXXXXX

96. NONE OF THESE QUESTIONS ARE APPLICABLE TO THE XXXXXXXX REGION MCC. WE ARE AN INTEGRATED MCC. ALL NOM/NAS SPECIALISTS DEAL IN ALL SERVICE AREAS. WE DEAL WITH MILITARY, TELCO/POWER UTILITIES, AIR TRAFFIC, FLYING PUBLIC, NWS, ETC. WE ANSWER ALL PHONE CALLS, NOT JUST ONE SERVICE AREA AS THE OCCS ARE DOING. WE HANDLE EMERGENCIES (FIRE/AIRCRAFT, ETC). WE DO CALLBACKS, TROUBLESHOOT FACILITIES THROUGH RMM, DO ALL LOGGING OF LIRS, LLFS, ETC, EXCEPT FOR ACCESSING T AND AS, THE NOM/NAS DO THE SAME EXACT JOB
97. WE HAVE NOT GONE TO THE POCC CONCEPT YET. WE ARE STILL AN AMCC/GMCC FACILITY AS ONE WITH ONLY REPORTING REQUIREMENT TO NOCC
98. TO DATE, ONLY COORDINATION HAS BEEN WITH NOCC ON OPERATIONAL ISSUES. THEREFORE, MOST QUESTIONS ARE N/A
99. NO COMMENT